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Service

**Southwestern
Region**

Prescott National Forest

Vegetation and Fire Ecology Specialist Report

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for

Forest Plan Revision
Environmental Impact Statement

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Introduction

The purpose of this report is to evaluate the potential environmental consequences to vegetation and fire regimes that may result with the adoption of a revised land management plan. It examines the consequences of taking no action to revise the existing plan and of three alternative actions: the proposed revision of the Forest Plan, an alternative that emphasizes vegetation and wildlife habitat restoration, and an alternative that emphasizes dispersed recreation opportunities.

Fire has long played a role in shaping the vegetation of the Prescott National Forest. The resiliency of many ecosystems is dependent upon fire as a frequent disturbance process; the structure and function of vegetation are closely intertwined with the role of fire. Hence, they are examined together in this report.

This report describes:

- Laws that are relevant to vegetation and fire management on the Prescott National Forest
- The vegetation and fire environment affected by the alternatives
- The needs for change identified in revising the existing plan
- The sections of each proposed alternative that are relevant to vegetation and fire
- The environmental consequences of the alternatives
- The relationship between the short-term and long-term consequences of the alternatives
- The cumulative consequences to the environment of the alternatives

Relevant Laws, Regulations, and Policy that Apply

The authority for restoring National Forest System lands derives from many laws enacted by Congress that define the purpose of national forests and grasslands. Forest Service Manual 2020 – Ecological Restoration and Resilience, summarizes the principal statutes that govern management and restoration, and provides an overview of each statute.

The Laws include:

- Organic Administration Act of 1897 (16 U.S.C. 475, 551)
- Weeks Law of 1911, as amended (16 U.S.C. 515, 552)
- Knutsen-Vandenberg Act of 1930 (16 U.S.C. at 576b)
- Anderson-Mansfield Reforestation and Revegetation Joint Resolution Act of 1949 (16 U.S.C. 581j and 581j(note))
- Granger-Thye Act of 1950 (16 U.S.C. at 580g-h)
- Surfaces Resources Act of 1955 (30 U.S.C. 611-614)
- Sikes Act (Fish and Wildlife Conservation) of September 15, 1960 (16 U.S.C. at 670g)
- Multiple-Use Sustained Yield Act of 1960 (16 U.S.C. 528-531)
- Wilderness Act of 1964 (16 U.S.C. §§ 1131 et seq.)
- Wild and Scenic Rivers Act (82 Stat. 906, as amended, 16 U.S.C. 1271 (note), 1271-1287)
- National Environmental Policy Act (NEPA) of 1969 (16 U.S.C. 4321 et seq.)

- Endangered Species Act of 1973 (P.L. 93-205, 87 Stat. 884; 16 U.S.C. 1531-1544, as amended)
- Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended by National Forest Management Act (NFMA) of 1976 (16 U.S.C. 1600-1614, 472a)
- Clean Water Act of 1977 (33 U.S.C. 1251, 1254, 1323, 1324, 1329, 1342, 1344; 91 Stat. 1566)
- Clean Air Act, as amended 1977 and 1990 (42 U.S.C. 7401, 7418, 7470, 7472, 7474, 7475, 7491, 7506, 7602)
- North American Wetland Conservation Act of 1989 (16 U.S.C. 4401 (note), 4401-4413, 16 U.S.C. 669b (note))
- Healthy Forests Restoration Act (HFRA) of 2003 (16 U.S.C. at 1611-6591)
- Stewardship End Result Contracting Projects (16 U.S.C. 2104 (note))
- Tribal Forest Protection Act of 2004 (P.L. 108-278, 118 Stat. 868; 25 U.S.C. 3115a)

Principal Executive Orders relevant to ecological restoration are listed below:

- Executive Order 11514: Protection and enhancement of environmental quality (35 FR 4247, March 7, 1970).
- Executive Order 11644: Use of off-road vehicles on the public lands (37 FR 2877, February 9, 1972).
- Executive Order 11988: Floodplain management (42 FR 26951, May 25, 1977).
- Executive Order 11990: Protection of wetlands (42 FR 26961, May 25, 1977).
- Executive Order 13112: Invasive Species (64 FR 6183, February 8, 1999).

Forest Service Manual 2020 itself also establishes further policy aimed to reestablish and retain ecological resilience of National Forest System lands.

The "Federal Wildland Fire Policy" is the principle document guiding fire management on Federal lands. The Policy was developed in 1995, and was further evaluated, and updated in the 2001 "Review and Update of the Federal Wildland Fire Management Policy." The "Guidance for Implementation of Federal Wildland Fire Management Policy," 2009, is the accompanying document that guides implementation of the Policy.

The Implementation Guide provides the terminology related to fire used in this report. Wildland fire is a general term describing any non-structure fire that occurs in vegetation or natural fuels. Wildland fires are categorized in two distinct types:

- Prescribed fires are planned management ignitions.

- Wildfires are unplanned ignitions, including escaped prescribed fires that are declared wildfires. Wildfires may be ignited by natural causes, namely lightning, or human-caused. Under the current Implementation Guide, some sort of suppression action is taken on all human-caused wildfires.

The Implementation Guide states that fire, as a critical natural process, will be integrated into the land management plan. It also states that wildland fire, including prescribed fires and naturally caused wildfires, "will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role as a disturbance factor in the ecosystem" (USDA and others 2009).

Description of Affected Environment (Existing Conditions)

Wildland Fire

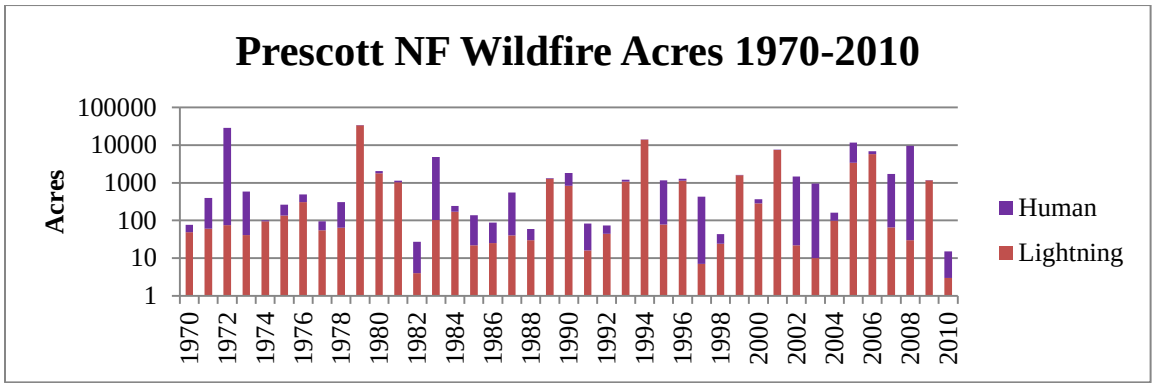
Regional climate patterns strongly influence the natural fire regimes of Arizona and New Mexico by modulating the frequency, magnitude, and seasonality of fire occurrence (Swetnam and Betencourt 1998). During May and early June, when vegetation and fuels are at their driest, periodic convective storms generate lightning, and fires occur at low levels. Throughout June, fire occurrence increases dramatically and peaks in early July with the onset of the monsoon season and a high incidence of lightning. As the monsoon precipitation increases and vegetation and fuels become wetter, fire occurrence decreases considerably during the months of August and September. This pattern of seasonal fire has shaped the vegetation of the Southwest for centuries and plays a vital a role in retaining ecosystem components, processes, and functions.

In the late 19th century, Euro-American settlement brought many new land uses to the Southwest including mining, logging, livestock grazing, fire suppression or exclusion, and road building. These factors have interacted across the landscape, changing ecological conditions in far reaching ways (Friederici 2003). One evident result has been the alteration of natural fire patterns in many Prescott NF ecosystems. For example, fire history studies conducted in ponderosa pine stands in the Prescott Basin (Sneed et al. 2002) reveal a mean fire return interval of 2-5 years for the period 1652 to 1896. After 1896, there were no fires recorded as fire scars in the study area. For most sample trees, fires ceased to be recorded after 1875. This example of the interruption of natural, frequent fire cycles is similar to other areas of the Southwest (Covington and Moore 1994; Savage 1991; Savage and Swetnam 1990).

Today the Prescott NF contains uncharacteristically dense forests and woodlands with many more young trees than were present prior to the 1880s. The forest and woodlands are currently deficient in grasses and forbs, due to tree and shrub competition, and are at higher risk for uncharacteristic wildfires due to the accumulated buildup of live and dead woody material, increased crown bulk density, and increased canopy continuity (USFS 2009b).

Figure 1 displays the wildfire acres by ignition source that have occurred on the Prescott NF since 1970. Lightning accounts for 60 percent of the ignitions reported and 55 percent of the acres burned. The total area burned per year has averaged 3,369 acres (range 15 – 33,652 acres).

Figure 1. Wildfire occurrence on the Prescott National Forest for the period 1970-2010.



The majority of modern wildfires on the Prescott NF are still caused by lightning rather than human activity (figure 2). Wildfire occurrences have varied considerably over the last forty years with more occurring during the decade of the 1970's (1,213 total wildfires) than during the decade of the 2000's (808 total wildfires).

This apparent decrease in the number of wildfires may be due in part to the increased role that prescribed fire has played as a restoration tool. In recent years, Prescott NF fire managers have used prescribed fire to reduce live and dead woody material and to increase the space between tree and shrub canopies in selected vegetation types. Figure 3 shows a postive trend in the number of acres burned by prescribed fire for the years 2000 to 2010, and a relatively stable trend in the number of acres burned by wildfire for the same period. If the primary anthropogenic stress to fire-adapted vegetation communities has been a century of fire suppression and exclusion, then the recent application of prescribed fire may be an early indicator of success at modifying the current but unnatural fire regimes, and being able to reduce the risks to ecosystem services, especially those that stem from changing climate conditions (Hurteau and Brooks 2011).

Figure 2. Wildfire occurrence by fire cause for the Prescott National Forest for the period 1970-2010.

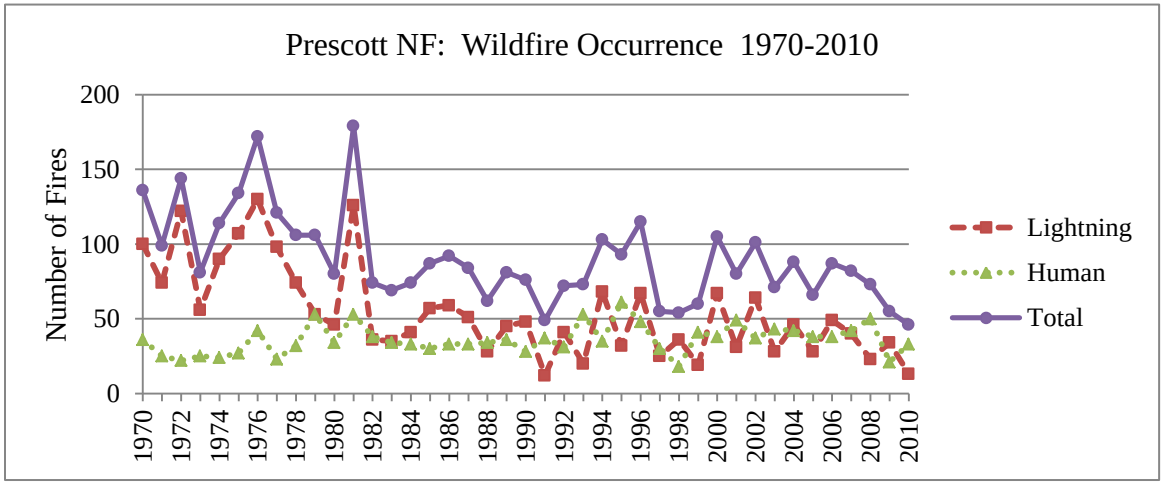
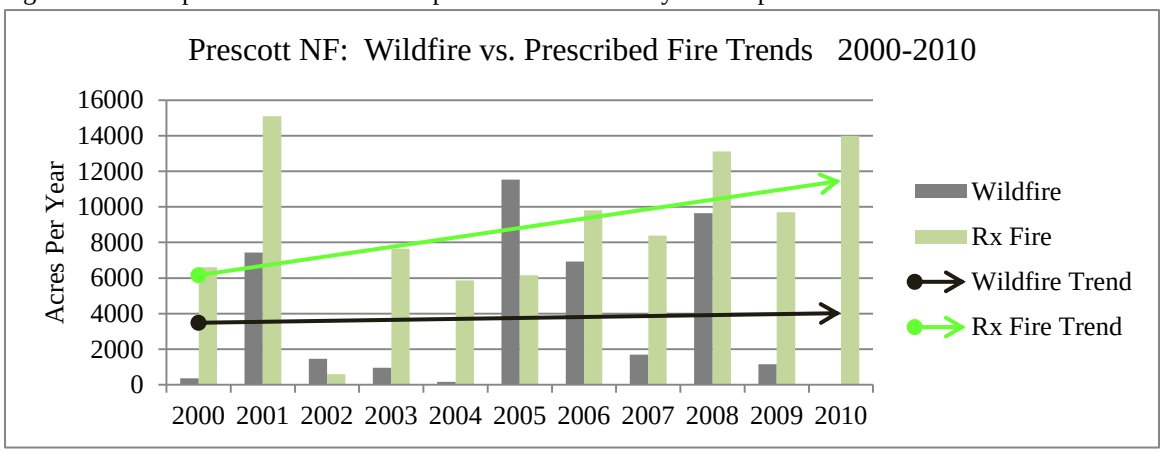


Figure 3. A comparison of wildfire and prescribed fire activity for the period 2000-2010.



Vegetation

During plan revision efforts, a framework was needed to classify and map areas of the Prescott NF based on associations of ecological factors including vegetation and fire. The Prescott NF used **Potential Natural Vegetation Types (PNVTs)** as a basis for grouping similar units of vegetation, soil, climate, and disturbance at a landscape scale. PNVTs represent the vegetation type and characteristics that would occur when natural disturbance regimes and biological processes prevail. It is important not to confuse PNVTs with existing vegetation types. The PNVT classifications were developed from data available in the Terrestrial Ecosystem Survey of the Prescott NF (Robertson et al., 2000) and from information on vegetation dynamics and natural variability compiled by The Nature Conservancy[1] and the Landscape Fire and Resource Management Planning Tools Project[2] (commonly called LANDFIRE).

The status or condition of PNVTs can be evaluated by describing their unique ecosystem characteristics, which consist of a series of "states" and "transitions." States describe the life forms, composition, age or size, and relative density of the vegetation at different life stages. Transitions are disturbance events that modify the existing vegetation in various ways based on their magnitude, frequency, and extent. Transitions also include biological processes such as growth, development, and death. A "states and transitions" framework allows for simulating and testing vegetation dynamics using computerized models.

Reference conditions that identified the relative amount of each state, and the frequency of transitions between states, were estimated based on scientific literature (Schussman and Smith, 2006) and Forest Service experience within the western U.S. (Hann et al., 2008). Comparisons of the current situation to these reference conditions and desired conditions were made to identify the extent of departure for each PNVT. The levels of departure for the PNVTs were considered during the development of vegetation and fire treatment objectives proposed under the various alternatives. Computer models and published literature were used to estimate future PNVT conditions and ecological effects based on current PNVT conditions and the proposed vegetation and fire treatment levels of the various alternatives.

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[1] http://azconservation.org/downloads/category/southwest_regional/

[2] www.landfire.gov

Initial identification and classification of PNVTs resulted in 13 categories as reported in the Prescott NF Ecological Sustainability Report (Forest Service, 2009a). Additional data gathering and assessment since 2009 resulted in a refinement of the PNVT classification for the Prescott NF. Based on updated midscale vegetation inventory, field visits, data review, and bio-physical model fitting, the number of PNVTs identified on the Prescott NF was adjusted from 13 to 10. Table 1 lists these 10 PNVTs and their proportional area.

Table 1. Potential Natural Vegetation Types (PNVTs) of the Prescott NF

PNVT Name	Prescott National Forest	
	Acres	Percent
Semi-Desert Grassland	125,712	10 %
Great Basin Grassland	38,389	3 %
Juniper Grassland	137,274	11 %
Piñon-Juniper Evergreen Shrub	463,296	37 %
Interior Chaparral	315,445	25 %
Ponderosa Pine-Evergreen Oak	63,539	5 %
Ponderosa Pine-Gambel Oak	49,052	4 %
Piñon-Juniper Woodland	36,263	3 %
Desert Communities	5,919	< 1 %
Riparian Gallery Forest	12,439	1 %
Total	**1,247,328**	**100 %**

Refinements in the identification and classification of PNVTs included:

- The Mixed-Conifer with Frequent Fire PNVT (6,600 acres) was combined with the Ponderosa Pine Forest PNVT because they are described by the same biophysical setting model (e.g., vegetation structure and disturbance regime) developed by the Nature Conservancy[3]. The Ponderosa Pine Forest PNVT was later renamed as Ponderosa Pine-Gambel Oak PNVT.
- The Mixed-Conifer with Aspen PNVT (80 acres) was determined to be a mis-identification and the acres were added to the Ponderosa Pine-Gambel Oak PNVT.
- The Madrean Encinal Woodland PNVT (5,500 acres) map units were grouped with adjoining PNVT units because of concerns about their identification. Most of the indicator species describing this PNVT, with the exception of the Mexican pines, were observed during field

[3] TNC biophysical setting model "Ponderosa Pine/Bunchgrass"

visits to the small and scattered map units assigned to this PNVT. These units were found to be interspersed with Interior Chaparral and Ponderosa Pine-Evergreen Oak PNVTs, suggesting the possibility that multiple fire disturbance regimes existing in close proximity to one another could account for the observed variations in vegetation composition and structure. There is uncertainty in how much the observed vegetation structure may reflect recent land use and/or disturbance history versus the presence of a distinct PNVT. Until additional information is available to address the uncertainty associated with identification of the Madrean Encinal Woodland PNVT, it was decided to manage the vegetation of these map units based on their adjoining PNVT.

- The Colorado Plateau Grassland PNVT also known as Colorado Plateau/Great Basin Grassland[4] was shortened in name to Great Basin Grassland PNVT to acknowledge the fact that the Prescott NF does not reside on the Colorado Plateau. The Riparian Forest PNVT[5] was renamed Riparian Gallery Forest PNVT in recognition of the long and narrow patterns that this PNVT forms along perennial and intermittent streams found on the Prescott NF.

As shown in Table 2 below, some PNVTs are more similar to desired conditions than others. For most of the PNVTs, however, the vegetation and fire characteristics currently found in a PNVT are not the same as those described in the desired condition.

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[4] LANDFIRE biopysical setting model #1511350 “Inter-Mountain Basins Semi-Desert Grassland”

[5] LANDFIRE biophysical setting model #1511552 “North American Warm Desert Riparian Systems”

Table 2. Current conditions of PNVTs found on the Prescott NF

Potential Natural Vegetation Type	Acres	Percent of PNF Area	Similarity to Desired Conditions		Management Concerns
			Vegetation Structure	Fire Disturbance	
Semi-Desert Grassland	125,712	10%	Low	Low	Lack of desired fire disturbance; tree and shrub encroachment; increases in exposed soil surface and spread of non-native plants
Great Basin Grassland	38,389	3%	High	Moderate	
Juniper Grassland	137,274	11%	Moderate	Moderate	Lack of desired fire disturbance; increased tree and shrub density and canopy cover; lack of perennial grasses and forbs
Piñon-Juniper Evergreen Shrub	463,296	37%	Low	Moderate	
Piñon-Juniper Woodland	36,263	3%	High	High	
Interior Chaparral	315,445	25%	High	High	Wildfire threat to human life and property
Ponderosa Pine-Evergreen Oak	63,539	5%	Low	Low	Increased tree and shrub density; increased fuel load, increased risk of uncharacteristic high intensity fire, proximity to human life and property
Ponderosa Pine-Gambel Oak	49,052	4%	Low	Low	
Desert Communities	5,919	<1%	High	High	Threat of human-caused fire
Riparian Gallery Forest	12,439	1%	High	High	Invasion by non-native plants; trampling of vegetation
Grand Total:	1,247,328	100%			

Current conditions and ecosystem concerns summarized above are described in more detail for each PNVT in the sections below. Several of the PNVTs have been grouped as follows to facilitate discussion throughout the remainder of this document: Grassland PNVTs (Semi-Desert and Great Basin), Piñon-Juniper PNVTs (Juniper Grassland, Evergreen Shrub, and Woodland), and Ponderosa Pine PNVTs (Ponderosa Pine-Evergreen Oak and Ponderosa Pine-Gambel Oak).

Grassland PNVTs

There are two grassland PNVTs classified for the Prescott NF: Semi-Desert and Great Basin. Grassland PNVTs are characterized as having less than 10 percent tree cover.

The **Semi-Desert Grassland PNVT** encompasses roughly 126,000 acres at elevations ranging from 3,000 to 4,500 feet. These grasslands are bounded by desert communities at the lowest elevations and Piñon-Juniper Woodlands or Interior Chaparral at higher elevations. Species composition and dominance varies based on soils and topography. The more common grass species include black grama, blue grama, hairy grama, tobosa, and giant sacaton. Various shrubs species also inhabit these grasslands including: creosote bush, catclaw acacia, mimosa, burroweed, broom snakeweed, and mesquite.

The **Great Basin Grassland PNVT** encompasses almost 38,000 acres and intermingles with piñon-juniper ecosystems adjacent to the Chino Valley. This grassland PNVT is higher in elevation (approximately 4,700 to 7,600 feet) and climatically cooler and moister than the Semi-Desert Grassland PNVT. Vegetation consists mostly of grasses and forbs with interspersed shrubs. Grass species may include, but are not limited to, Indian ricegrass, threeawns, blue grama, needle grass, bottlebrush squirreltail, James' galleta, dropseed, and tobosa grass. Shrub and half-shrub species may include, but are not limited to, saltbush, snakeweed, winterfat, buckwheat, and juniper.

The grasslands PNVTs of the Prescott NF have undergone some dramatic changes over the last 130 years. Changes include encroachment by trees and shrubs, loss of perennial grass cover, loss of cool season plant species, increase in exposed soil surface, and the spread of non-native annual grasses. Fire plays a key role in the maintenance of grasslands (McPherson, 1995). Fire historically occurred every 10 to 30 years in the Great Basin Grassland PNVT and 2 to 10 years in the Semi-Desert Grassland PNVT.

The Semi-Desert Grassland PNVT shows low similarity to (severe departure from) desired conditions in both vegetation structure and fire regime. In contrast, the Great Basin Grassland PNVT exhibits a high similarity to (low departure from) desired conditions for vegetation structure and composition. Fire occurrence in the Great Basin Grassland PNVT has been less frequent than desired over the past 25 years and the reintroduction of fire is needed to prevent a trend away from desired ecological conditions.

Healthy grasslands are important habitat for a variety of wildlife species and are essential to maintaining pronghorn antelope populations. Pronghorn antelope was chosen a Management Indicator Species (MIS) for the grasslands PNVTs because it demonstrates a strong and/or predictable response to proposed management activities including prescribed fire; shrub and tree thinning/removal; road and/or trail maintenance; and watershed or rangeland improvements.

Piñon-Juniper PNVTs

At roughly 636,800 acres, the three piñon-juniper PNVTs cover a majority of the Prescott NF landscape and represent one of the most extensive plant communities in the Southwest. These PNVTs are characterized by piñon and/or juniper species at elevations ranging from 4,500 to 7,500 feet. The piñon component includes Colorado and single leaf species. The juniper component is a variable mix of alligator, oneseed, Utah, and Rocky Mountain. Annual and perennial grasses, forbs, and shrubs can be found beneath the woodland overstory. Species composition, stand structure, and density vary by location primarily due to disturbance history, precipitation, elevation, temperature, and soil type. On erosive soil types within these communities, shrub, tree, and herbaceous ground cover help to lessen raindrop intensity and soil movement.

The piñon-juniper ecosystems on the Prescott NF have been classified as three distinct PNVTs: Juniper Grassland, Piñon-Juniper Evergreen Shrub, and Piñon-Juniper Woodland. Each one is described in more detail in the following sections.

The **Juniper Grassland PNVT**, with a grass and forb-dominated understory and scattered overstory trees, generally occurs on flats, basins, gentle sloping foothills, and transitional valleys at generally lower elevations. The soils associated with Juniper Grasslands are generally deep and productive. Juniper Grasslands cover about 137,300 acres of the Prescott NF.

Existing conditions for the Juniper Grassland PNVT are moderately similar to (moderately departed from) desired ecological conditions. Fire has been excluded from this PNVT for most of the last century, allowing for increases in the age, density, and canopy cover of trees and shrubs and a reduction in fire-stimulated re-growth and germination of perennial grasses and forbs. The desired fire frequency is every 1 to 35 years.

The **Piñon-Juniper Evergreen Shrub PNVT**, with an understory dominated by a mix of shrub species, generally occurs on elevated and lowland plains, hills, and lower-mountain slopes. The soils associated with this PNVT are variable and include those derived from granite, limestone, basalt, sandstone, and alluvium. Covering more than 463,000 acres, this is the most common piñon-juniper PNVT on the Prescott NF.

The Piñon-Juniper Evergreen Shrub PNVT has low similarity to (high departure from) desired conditions for vegetation structure. For example, within-group tree and shrub density is higher than expected, and shrub canopy cover lacks variability. There is a higher proportion of recently disturbed, open-canopy grass-forb-shrub state than expected. This is likely due to management activities during the 1950s to 1970s that involved "juniper pushes" where juniper trees were removed for fuelwood or to increase grass cover for livestock grazing. The fire regime for this PNVT is moderately similar to (moderately departed from) desired conditions with less than desired frequency, but similar severity and intensity of fires when they do occur.

The **Piñon-Juniper Woodland PNVT** has a persistent tree overstory and a discontinuous understory of grasses and shrubs. It generally occurs on flats, ridge tops, rugged uplands, and steep slopes at various elevations and on soils that are shallow and rocky. Covering about 36,000 acres, this PNVT is the least abundant of the piñon-juniper vegetation types on the Prescott NF. Fire in this PNVT is less frequent and more variable than in the Juniper Grassland and Piñon-Juniper Evergreen Shrub PNVTs due to differences in the amount and arrangement of vegetative ground cover and fine fuels. Vegetation structure and fire regimes within the Piñon-Juniper Woodland PNVT exhibit a high similarity to (low departure from) desired ecological conditions.

Interior Chaparral PNVT

The Interior Chaparral PNVT extends over 315,400 acres, and represents the second-largest PNVT on the Prescott NF. Interior Chaparral occurs at mid-elevations (3,400 to 6,600 feet) on foothills and lower mountain slopes. It is bordered by ponderosa pine or piñon-juniper woodlands and shrublands at the upper elevations, and semi-desert grasslands at the lower elevations. Interior Chaparral vegetation has a uniform dense structure dominated by shrubs with thick, often stiff, waxy evergreen leaves.

The vegetation composition, structure, and fire characteristics within the Interior Chaparral PNVT on the Prescott NF exhibit high similarity to (low departure from) desired conditions. Prescribed fires and hazardous fuel reduction activities implemented under the 1987 Plan have

contributed to these conditions. Wildland urban interface[6] areas occur within this PNVT. A range of prescribed fire and fuel treatment objectives are evaluated in the proposed alternatives to maintain these desired conditions and to address concerns about the proximity of this wildland vegetation to human developments, life and property.

Ponderosa Pine PNVTs

There are two ponderosa pine PNVTs classified for the Prescott NF: Ponderosa Pine-Evergreen Oak and Ponderosa Pine-Gambel Oak.

The Ponderosa Pine-Evergreen Oak PNVT covers more than 63,500 acres of the Prescott NF at elevations ranging from approximately 6,000 to 7,500 feet. This PNVT is dominated by ponderosa pine and can be distinguished from the Ponderosa Pine-Gambel Oak PNVT by one or more well-represented evergreen oak tree species (e.g., Emory oak and Arizona white oak), juniper species, piñon pine species, and Arizona cypress in some locations. This PNVT has an understory of primarily evergreen shrubs including manzanita, turbinella oak, sumac species, and mountain mahogany species.

Conditions found within the Ponderosa Pine-Evergreen Oak PNVT show low similarity to (high departure from) desired ecological conditions. Fuel loads have accumulated on the forest floor. This PNVT has too many young and mid-aged trees and shrubs growing closely together. The current fire regime is dissimilar to the desired regime that includes: a frequency of every 6 to 12 years with low intensities to maintain an open pine forest with a mix of young evergreen oaks and shrubs underneath (Shussman and Smith, 2006). When wildfires occur under current conditions, they are more likely to kill many of the large and old trees, moving the vegetation structure further from desired conditions, thereby increasing the time it would take to restore forest structure to groups of uneven aged, multi-storied stands described in the desired conditions.

Approximately two thirds of this PNVT includes areas of wildland urban interface. A range of prescribed fire and fuel treatment objectives are evaluated in the proposed alternatives to address concerns about the proximity of this wildland vegetation to human developments, life and property.

The Ponderosa Pine-Gambel Oak PNVT occurs on about 49,000 acres of the Prescott NF at elevations ranging from 5,500 to 9,000 feet. This PNVT is dominated by ponderosa pine and Gambel oak and commonly includes other tree species such as New Mexico locust, juniper, and piñon. Occasionally, tree species such as aspen, Douglas-fir, and white fir may be present, especially in relatively moist or shady areas. Desired conditions include an understory of grasses and forbs with occasional shrubs.

This PNVT has low similarity to (high departure from) desired conditions. Similar to the Ponderosa Pine-Evergreen Oak PNVT, fine fuels in this PNVT have accumulated on the forest floor. There are too many young and mid-aged trees and not enough old trees. The natural fire regime is dissimilar to the desired regime that includes: a frequency of every 1 to 15 years with low intensities to maintain an open pine forest with abundant herbaceous cover (Covington, 2003). When wildfires occur under current conditions, they are more likely to kill many of the

[6] The wildland urban interface includes those areas of resident populations at imminent risk from wildfire, as well as human developments having special significance. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites regardless of the distance involved.

large and old trees, moving the vegetation structure further from desired conditions, thereby increasing the time it would take to restore forest structure to groups of uneven aged, multi-storied stands described in the desired conditions for the Ponderosa Pine-Gambel Oak PNVT.

Healthy pine forests provide important habitat for a variety of wildlife species and are essential to maintaining bird populations such as the Northern goshawk and Mexican spotted owl. Northern goshawk was chosen as a Management Indicator Species (MIS) for the ponderosa pine PNVTs because it demonstrates a strong and/or predictable response to proposed management activities including prescribed fire; timber harvest; shrub and tree thinning/removal; and road and/or trail maintenance.

Desert Communities PNVT

The Desert Communities PNVT covers approximately 5,900 acres of the lowest elevations of the Prescott NF. They most often have the appearance of a scrubland or low woodland of leguminous trees with intervening spaces held by one to several open layers of shrubs, cacti and perennial succulents. This PNVT is found on slopes, broken ground, and multi-dissected sloping plains.

Historically, weather events such as drought, frost, and wind thinned the dominant overstory plants. Vegetation within the Desert Communities PNVT is not thought to have supported fuel loads to sustain large fires prior to European habitation of the region. Fires would have been associated with dry lightning coincident with monsoonal storms during years when previous winter precipitation was sufficient to create a thick fine-fuel bed of annual plants. Fires killing a high proportion of the overstory plants were very rare or absent (averaging about once in 100 to 998 years).

The vegetation composition and structure within the Desert Communities PNVT exhibit high similarity to (low departure from) desired conditions. Over the last few decades, however, some non-native grasses have invaded this PNVT providing fuel for uncharacteristic and more frequent fire. Currently, the natural disturbance regime has been altered somewhat by the periodic occurrence of human-caused wildfires.

In the Desert Communities PNVT, projected warming and drying could enhance the invasion of non-native plant species that are adapted to fire. These species grow quickly in the spring and then dry and cure so that wildfire risks increase. The natural vegetation within this PNVT is not adapted to fire and can require long time periods to reproduce. Fire can greatly change the plant composition and thus change the desert plant communities so that birds and other wildlife species may be affected.

Riparian Gallery Forest PNVT

The Riparian Gallery Forest PNVT occurs along perennial or intermittent streams and around springs and seeps. It covers approximately 12,400 acres and ranges in elevation from 2,000 to 8,000 feet (Forest Service, 2009a). The two major vegetation communities within it are cottonwood-willow and mixed broadleaf deciduous forests. The dominant woody vegetation varies according to elevation, substrate, stream gradient, and depth to groundwater. The juxtaposition of floodplains and stream terraces contribute to the mix of vegetative structures within the PNVT, including narrow stringers of mixed deciduous trees (gallery forest) and willow-, desert willow- or mesquite-dominated shrublands. Common species include Fremont cottonwood, narrowleaf, Gooding, and Bebb willow, Arizona sycamore, velvet and green ash, Arizona alder, Arizona walnut, and box elder. Herbaceous plants include several forbs, sedges,

rushes, and grasses. Desert willow, mimosa, rubber rabbitbrush, and mesquite shrubs occur in dewatered areas.

Flooding and time between floods are the driving developmental forces in Riparian Gallery Forest PNVTs. In addition to periodic flooding, American Indians had an influence on vegetation composition and structure by favoring edible plants (e.g., mesquite), collecting fuel wood, and burning to flush animals and increase accessibility to open water and agricultural fields (LANDFIRE, 2007). These influences were likely limited to areas near perennial stream courses, and not to areas adjacent to either intermittent water or springs and seeps imbedded in the upland vegetation (LANDFIRE, 2007). Outside of possible American Indian influence, wildland fires appear to have been infrequent in riparian communities dominated by cottonwood, willow, and mesquite species prior to invasion by tamarisk (Busch and Smith, 1993).

The Riparian Gallery Forest PNVT exhibits a high similarity to (a low departure from) desired conditions for vegetation structure and fire regime. However, the spread of non-native invasive plant species, soil compaction and loss of vegetation due to visitor use are known threats to the health of this PNVT.

Needs for Change Addressed in this Analysis

This report evaluates how well plan revision alternatives address one of five priority needs for change identified in the Analysis of the Management Situation (USFS 2009a). That need for change relates to both wildland fire and vegetation management and is stated as follows:

Need for Change Topic 1: Restore vegetation, structure, composition, and desired characteristics of fire to selected ecosystems, while responding to citizen concerns related to smoke emissions.

This need for change topic addresses the following current conditions:

- Disturbance patterns (namely fire) in grassland ecosystems are much less frequent than those identified in desired conditions, resulting in undesired shrub and tree encroachment.
- Because of their current conditions, several ecosystems dominated by ponderosa pine, are at risk of high severity, uncharacteristic fire which can negatively impact the health of those ecosystems as well as human safety in nearby communities.
- Changes in ecosystem conditions and trends, such as higher density and cover of shrubs and trees or the presence of non-native vegetation, may be affecting the diversity and viability of plant and animal species.
- Ecosystem resilience needs to be promoted to respond to climate change, especially in vegetation communities that are departed from desired conditions or are trending away.
- Social concerns related to smoke in and near communities, such as nuisance and possible health sensitivities, need to be considered for planning and managing prescribed fire activity.

Analysis Questions

This report evaluates how well plan revision alternatives address the followimg questions:

- *How would actions listed in each alternative affect motion toward vegetative desired conditions for each PNVT?*
- *How would actions listed in each alternative build ecosystem resilience and capacity for plant communities to accommodate expected changes imposed by future climate trends?*

Evaluation Criteria (Indicators of Consequences)

Evaluation criteria for whether an alternative is addressing the analysis questions include the following Vegetation Dynamics Development Tool (VDDT) model outputs:

- Changes in proportions of vegetation states over time.
- Similarity to Desired Conditions Index: This index represents the relative similarity between the current conditions (proportions in each state) and the "desired" conditions for a given vegetation type as modelled between two time periods: year zero and 10-, 20-, 40- , or 80-years into the future. The index is measured on a scale from 1 to 100 with 100 representing maximum similarity. Higher index values are an indicator that ecosystems are retaining their components, processes, and functions under changing environmental conditions. See Appendix A for sample calculations.
- Open states with 30 percent canopy cover or less for the woodland and forest vegetation types: This is an indicator of desired fire behavior, as open states promote surface fire, rather than active crown fire. It is also an indicator of the amount of particulate emissions that would result from a wildfire, with surface fires producing less than crown fires. Smoke emissions are addressed in depth in the Prescott National Forest Air Quality Specialist Report (USFS 2011b).
- Fire Frequency: For each alternative, estimates of future fire frequency were compared to the desired fire frequency based on the total area of PNVT divided by the amount of prescribed fire activity expected annually.

All criteria based on VDDT outputs are evaluated at the current, 10-year, 20-year, 40-year and 80-year time intervals.

Summary of Alternatives

The sections below describe the alternatives in terms of vegetation and fire management.

Alternative A – 1987 Forest Plan Direction:

Alternative A would continue management under the existing plan for the Prescott National Forest. The plan provides for timber production, fuelwood harvest, hazardous fuel reduction treatments, prescribed fires and wildfires managed to meet resource objectives.

Under Alternative A, thinning to alter or restore vegetation structure and composition occurs on about 550 acres per year in ponderosa pine and on 300 acres per year in pinon-juniper vegetation. Fire managers treat about 7,835 acres per year using prescribed fire across all vegetation types.

Prescribed fire activities are coordinated with the Arizona Department of Environmental Quality, as well as with adjacent agencies, to ensure that exceedences of State or Federal emissions standards do not result.

Alternative B – The Proposed Revised Plan:

Alternative B represents approximately 1-2 years of collaborative work with citizens, agencies, and Prescott NF employees in an iterative manner to respond to suggested changes in proposed plan components. It places an emphasis on restoring vegetation, structure, composition, and desired characteristics of fire to five ecosystems that are moderately or highly-departed from desired conditions. It also addresses citizen concerns related to smoke emissions and responds to the anticipated effects of climate change. Eight potential wilderness areas are recommended.

Alternative B would increase the amount of thinning and prescribed fire occurring across the landscape. The estimated amounts of prescribed fire and wildfires managed for resource objectives would range from an about 10,600 to 25,300 acres per year on average. Estimated thinning treatments would range from about 750 to 6,500 acres per year on average.

Prescribed fire activities would be coordinated with the Arizona Department of Environmental Quality, as well as with adjacent agencies, to ensure that exceedences of State or Federal emissions standards do not result. Additionally, wildland urban interface (WUI) areas would be given high priority for fuel reduction treatments, using mechanical methods and/or domestic animals in lieu of prescribed fire.

Alternative C – Vegetation and Wildlife Habitat Emphasis:

Alternative C includes many of the same components of Alternative B, however, it responds to public comments to increase emphasis on vegetation trends within both grassland and ponderosa pine types. This focus improves vegetation conditions within important wildlife habitats and places less emphasis on some vegetation communities and recreational components. In addition, Alternative C includes more management treatment for native fish and other aquatic species and pronghorn habitats; there is much less emphasis on recommendation of potential wilderness areas.

Alternative C would emphasize a higher range of prescribed fire and a lower range of thinning activity compared to Alternatives A and B. The estimated amounts of prescribed fire and wildfires managed for resource objectives would range from about 15,500 to 22,800 acres per year on average and would be focused in grassland and ponderosa pine vegetation. Estimated thinning treatments would range from about 750 to 4,000 acres per year on average.

Response to smoke emissions in Alternative C is the same as that described in Alternative B.

Alternative D – Dispersed Recreation Emphasis:

Alternative D includes an emphasis on providing increased dispersed recreation opportunities. Vegetation treatments would be similar to those in Alternative B or slightly reduced. Emphasis

on pronghorn and native fish would be identical to Alternative B. Within recreational opportunities, there would be reduced emphasis on developed recreation, such as campgrounds, and increased emphasis on dispersed recreation such as adding trails, improving trailheads and adding designated dispersed sites. This alternative also includes recommendation of the highest number of potential wilderness areas.

Alternative D would emphasize less prescribed fire than Alternatives B and C, and similar or less thinning activity. The estimated amounts of prescribed fire and wildfires managed to meet resource objectives would range from about 10,600 to 18,800 acres per year on average. Estimated thinning treatments would range from about 750 to 4,000 acres per year on average (the same as Alternative C).

Response to smoke emissions in Alternative D is the same as that described in Alternative B.

Alternative E – The Preferred Alternative:

Alternative E was developed between draft and final versions of the proposed plan and EIS in response to issues and concerns heard during the public comment period. Alternative E is similar to alternative B in most elements, but with a reduced emphasis on developed recreation and trail maintenance and more clarity of direction for watersheds, forest access, and land acquisitions. This alternative recommends fewer acres for wilderness designation than alternatives B and D.

Alternative E proposes the same amount of thinning and prescribed fire occurring across the landscape as Alternative B. Prescribed fire and wildfires managed for resource objectives would range from an about 10,600 to 25,300 acres per year on average. Thinning treatments would range from about 750 to 6,500 acres per year on average.

Similar to Alternative B, prescribed fire activities would be coordinated with the Arizona Department of Environmental Quality, as well as with adjacent agencies, to ensure that exceedences of State or Federal emissions standards do not result. Additionally, wildland urban interface (WUI) areas would be given high priority for fuel reduction treatments, using mechanical methods and/or domestic animals in lieu of prescribed fire.

Table 3 summarizes for each alternative, the types of treatment (prescribed fire or prescribed thinning), the number of acres modelled (low end and high end), and the estimated total treatment activity used in this analysis.

Table 3: *Average Annual Acres of Treatment Activity Evaluated*

	Alt A	Alt B/E low	Alt B/E high	Alt C low	Alt C high	Alt D low	Alt D high
Rx Fire	7,835	10,600	25,300	15,500	22,800	10,600	18,800
Rx Thin	1,027	750	6,500	750	4,000	750	4,000
Totals	8,862	11,350	31,800	16,250	26,800	11,350	22,800

Methodology and Analysis Process

VDDT Modeling

The Vegetation Dynamics Development Tool (VDDT), Version 6.0.25 (ESSA Technologies, 2006), a Windows-based computer application, was used to forecast the response of the potential natural vegetation types to human-caused and natural disturbance events and agents proposed or expected under each of the plan alternatives. The software allowed for the non-spatial modeling of a series of vegetation states that differ in structure, composition, and canopy cover and to specify the amount of time it takes to move from one vegetation state to another in the absence of disturbance.

Various disturbance agents affecting the movement of vegetation between states (or transitions) are incorporated (e.g., mechanical vegetation treatments, surface fires, mixed-severity fires, stand-replacing fires, grazing, insect outbreaks, and drought events). By varying the types and rates of disturbance across the landscape, the effects of different disturbance regimes, such as historic and current fire regimes, or different management treatments, such as planned and unplanned fire ignitions, fire suppression, grazing practices, and mechanical fuel treatments, on vegetation can be investigated (Schussman and Smith, 2006). Input data used in modeling came directly from forest management activities and fire data over the last 25 years.

State destinations and transition probabilities for vegetation treatments were derived from Forest Vegetation Simulator (FVS), modeling, Version 6.31. FVS is a distance-independent; individual-tree forest growth model widely used in the United States and is used to compare alternatives.

State destinations for natural fires and fire treatments were derived from FVS, modeling, Version 2.02 and Fire and Fuel Extension (FFE) (Rebain, 2010). Forest Inventory and Analysis (FIA) plot data were used to calibrate the VDDT model to estimate relative proportions of even- and uneven-aged conditions on the forests (Weisz et al., 2012).

The following PNVTs were modeled using VDDT software: Ponderosa Pine-Gambel Oak, Ponderosa-Pine Evergreen Oak, Piñon-Juniper Evergreen Shrub, and Juniper Grassland. These PNVT models were developed by the Forest Service Southwestern Regional Office. The VDDT models for Interior Chaparral, Semi-Desert Grassland, and Great Basin Grassland PNVTs were developed by the Forest Service at the Forest level and reviewed at the regional level prior to analysis.

Some of the drawbacks and limitations of VDDT modeling are:

- VDDT is a non-spatial, long-range strategic model. It does not describe what is happening at a site-specific level of detail a model and is intended mainly for broad-scale analysis.
- Some of the VDDT inputs used were derived from other modeling outputs, for example FVS timber harvest treatment state transition destinations and the probability of those outcomes.
- The VDDT model divides vegetation conditions within each PNVT into a small number of discrete states, and it is acknowledged that there is more variability within each state than has been modeled.
- VDDT models overstory structure, composition, and cover as defined by mid-scale vegetation mapping in great detail, but does not model the understory vegetation (for example, the species composition of grasses and forbs).

- VDDT modeled the distribution of landscape states over time, and does not model the more detailed physical (e.g. soil temperature, precipitation, aspect, elevation, productivity), chemical and biological dynamics of what is happening at each scale of spatial resolution.
- VDDT models the probability and timing of events (such as fire behavior, management activities, insect and disease occurrences, etc.) based on empirical observations, but cannot accurately predict future behavior due to climate change or other phenomena outside of the historic range of variability.

It was assumed that the disturbances (e.g., management activities) selected for the VDDT model represent the majority of disturbances the Prescott NF experiences. There could be many variations to these disturbances; however these were not modeled in detail for this analysis. According to Lauenroth and Laycock (1989), and others, succession may follow multiple pathways and reach different end-points depending on the effects of disturbance on the life history characteristics of the vegetation; causing predictability to be limited by the importance of chance or infrequent events.

The results of each PNVT model run were recorded in electronic spreadsheets and calculations of differences between alternatives were performed. PNVT end states were compiled for each alternative and comparisons made between alternatives for similarity to desired condition descriptions and proportions of open-canopy states; results were then supplemented by other extra-model information for disclosure in the environmental effects analysis.

Vegetation Treatments

Management activities including tree thinning, shrub removal, and prescribed fire were input into individual VDDT models to estimate the resulting movement toward or away from desired conditions, the proportions of each vegetation state, and the expected fire frequency.

Alternative A was modeled using the average number of acres treated over a 10-year period (Table 4). The action alternatives (B, C, and D) were modeled at both the minimum (Tables 5, 7, and 9) and maximum (Tables 6, 8, and 10) proposed treatment levels to determine the potential range of outcomes. These outcomes were used to calculate the progress towards desired conditions under a range of treatment levels. This provided the basis for comparison of the trends established by the low and high levels of treatment for each alternative.

The vegetation treatments modeled for each alternative are summarized in the tables below.

The following codes were used to represent the modeled PNVTs:

- SDG Semi-Desert Grassland
- CPGB Great Basin Grassland
- JUG Juniper Grassland
- PJC Piñon-Juniper Evergreen Shrub
- CHAP Interior Chaparral
- PPE Ponderosa Pine-Evergreen Oak
- PPO Ponderosa Pine- Gambel Oak

The Piñon-Juniper Woodland, Desert Communities, and Riparian Gallery Forest PNVTs were not modeled for treatments.

Table 4. Average annual treatment acres for Alternative A

	SDG	CPGB	JUG	PJC	CHAP	PPE	PPO	**Totals**
Rx Thin acres	0	0	148	166	159	483	71	**1,027**
Rx Fire acres	914	6	408	1,568	3,103	1,457	379	**7,835**
Totals	914	6	556	1,734	3,262	1,940	450	**8,862**

Table 5. Lower-end average annual treatment acres for Alternative B/E

	SDG	CPGB	JUG	PJC	CHAP	PPE	PPO	**Totals**
Rx Thin Low acres	0	0	150	150	200	125	125	**750**
Rx Fire Low acres	2,500	100	500	1,200	3,800	2,000	500	**10,600**
Totals	2,500	100	650	1,350	4,000	2,125	625	**11,350**

Table 6. Higher-end average annual treatment acres for Alternative B/E

	SDG	CPGB	JUG	PJC	CHAP	PPE	PPO	**Totals**
Rx Thin High acres	0	0	200	2,000	3,500	400	400	**6,500**
Rx Fire High acres	6,500	500	800	6,000	6,500	4,000	1,000	**25,300**
Totals	6,500	500	1,000	8,000	10,000	4,400	1,400	**31,800**

Table 7. Lower-end average annual treatment acres for Alternative C

	SDG	CPGB	JUG	PJC	CHAP	PPE	PPO	**Totals**
Rx Thin								
Low acres	0	0	150	150	200	125	125	**750**
Rx Fire								
Low acres	6,500	500	500	1,200	3,800	2,200	800	**15,500**
Totals	6,500	500	650	1,350	4,000	2,325	925	**16,250**

Table 8. Higher-end average annual treatment acres for Alternative C

	SDG	CPGB	JUG	PJC	CHAP	PPE	PPO	**Totals**
Rx Thin								
High acres	0	0	200	1,000	2,000	400	400	**4,000**
Rx Fire								
High acres	8,500	1,000	800	2,000	4,000	4,500	2,000	**22,800**
Totals	8,500	1,000	1,000	3,000	6,000	4,900	2,400	**26,800**

Table 9. Lower-end average annual treatment acres for Alternative D

	SDG	CPGB	JUG	PJC	CHAP	PPE	PPO	**Totals**
Rx Thin								
Low acres	0	0	150	150	200	125	125	**750**
Rx Fire								
Low acres	2,500	100	500	1,200	3,800	2,000	500	**10,600**
Totals	2,500	100	650	1,350	4,000	2,125	625	**11,350**

Table 10. Higher-end average annual treatment acres for Alternative D

	SDG	CPGB	JUG	PJC	CHAP	PPE	PPO	**Totals**
Rx Thin								
High acres	0	0	200	1,000	2,000	400	400	**4,000**

Rx Fire								
High acres	6,500	500	800	2,000	4,000	4,000	1,000	**18,800**
Totals	6,500	500	1,000	3,000	6,000	4,400	1,400	**22,800**

Other data sources included:

- Summary field information compiled for the Ecological Classification of the Prescott National Forest (Girard et al. 2008).
- Corporate data on wildland fire occurrence

Assumptions

In the vegetation analysis, the following assumptions have been made:

- The land management plan provides a programmatic framework for future site-specific actions.
- Land management plans do not have direct effects. They do not authorize or mandate any site-specific projects or activities (including ground-disturbing actions).
- Land management plans may have implications, or environmental consequences, of managing the forests under a programmatic framework.
- The plan decisions (desired conditions, objectives, standards, guidelines, management areas, monitoring) will be followed when planning or implementing site-specific projects and activities.
- The planning timeframe is 10 years; other timeframes may be analyzed to compare anticipated trends into the future.
- The population and calibration of VDDT using FIA plots and FVS modeling of growth and disturbances generally represents the response of PNVTs well enough to compare outcomes proposed by the various alternatives in terms of desired conditions and treatment objectives.
- A range of treatment activities is proposed for each alternative. The VDDT model was used to estimate outcomes at the minimum and maximum levels of treatment for each vegetation and fire management objective.
- Because some of the treatment objectives target a combination of PNVTs, it was necessary to assign treatment levels to individual PNVTs based on testing of VDDT model sensitivity, existing and desired conditions, and professional judgement. As an example, Objective-3 under Alternative B states, *"treat 20,000 to 90,000 acres in juniper grasslands, piñon-juniper shrublands, or piñon-juniper woodlandss PNVTs using mechanical treatments, fire, or domestic livestock …"* The objective does not specifically define how much of each activity is to occur for each PNVT. The specific model inputs used for each alternative can be examined in Appendix A.
- The population and calibration of VDDT using FIA plots and FVS modeling of growth and disturbances generally represents the response of PNVTs well enough to compare

outcomes proposed by the various alternatives in terms of desired conditions and treatment objectives.

- A range of treatment activities is proposed for each alternative. The VDDT model was used to estimate outcomes at the minimum and maximum levels of treatment for each vegetation and fire management objective.
- Because some of the treatment objectives target a combination of PNVTs, it was necessary to assign treatment levels to individual PNVTs based on testing of VDDT model sensitivity, existing and desired conditions, and professional judgment. As an example, Objective-3 under Alternative B states, "treat 20,000 to 90,000 acres in juniper grasslands, piñon-juniper shrublands, or piñon-juniper woodlands PNVTs using mechanical treatments, fire, or domestic livestock …" The objective does not specifically define how much of each activity is to occur for each PNVT. The specific model inputs used for each alternative are displayed above.

Environmental Consequences

The land management plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carryout any project or activity. Because the land management plan does not authorize or mandate any site-specific projects or activities (including ground-disturbing actions) there can be no direct effects. However, there may be implications, or longer term environmental consequences, related to management of the Prescott NF under this programmatic framework.

Environmental consequences are discussed below in terms of the expected changes in proportions of vegetation states over time using the three evaluation criteria first described on page 12:

- *Similarity to Desired Conditions Index*
- *Proportions of Open States (30% or less canopy cover)*
- *Fire Frequency*

Similarity to Desired Conditions Index

The amount of tree and shrub thinning and prescribed fire proposed under each alternative, as modelled in VDDT, influences the attainment of desired conditions. The Similarity to Desired Conditions Index (or Similarity Index), represents the relative similarity between descriptions of the "current conditions" and the "desired conditions" for a given vegetation type.

Computer models were used to determine similarity of current and future vegetation structure to desired conditions. Estimates of the current conditions and short and long term outcomes were identified. Index values were used to summarize this information: values of 1 to 33 indicate little similarity between estimates and desired condition descriptions; values between 34 to 66 indicate moderate similarity; and values between 67 and 99 indicate high similarity between current or future conditions and desired conditions. For each PNVT, table 4 displays the similarity index value at each time-step by Alternative. Details of this analysis are described in the sections that follow table 11.

Table 11. Summary of Expected Desired Condition Index Values by PNVT by Alternative.

Semi-desert Grass

	Desired Conditions Index Values*		
Years	Alt A	Alt B/E,D	Alt C
0	31	31	31
10	35	44-62	62-69
20	38	55-81	81-89
40	45	70-97	93-97
80	47	74-92	91-92

Great Basin Grass

	Desired Conditions Index Values*		
Years	Alt A	Alt B/E,D	Alt C
0	83	83	83
10	76	78-81	81-84
20	71	73-81	81-89
40	66	70-83	83-95
80	67	72-85	85-96

Juniper Grass

	Desired Conditions Index Values*		
Years	Alt A	Alt B/E, C,D	
0	55	55	
10	62	61-62	
20	66	65-66	
40	71	71-72	
80	72	72-73	

P-J Shrubland

	Desired Conditions Index Values*		
Years	Alt A	Alt B/E	Alt C, D
0	29	29	29
10	38	37-38	38-38
20	43	43-51	44-51
40	50	51-51	51-51
80	55	56-57	56-56

Pine-Evergreen Oak

	Desired Conditions Index Values*		
Years	Alt A	Alt B/E,D	Alt C
0	17	17	17
10	40	38-43	38-45
20	46	44-50	44-51
40	50	45-51	46-52
80	48	45-50	44-50

Pine-Gambel Oak

	Desired Conditions Index Values*		
Years	Alt A	Alt B/E, D	Alt C
0	20	20	20
10	26	27-30	27-31
20	28	28-31	28-33
40	30	31-33	31-35
80	34	34-36	34-36

Chaparral

	Desired Conditions Index Values*		
Years	Alt A	Alt B/E	Alt C/D
0	90	90	90
10	92	94-97	94-96
20	92	94-97	94-96
40	92	94-98	94-96
80	92	94-97	94-96

* Desired Condition Index Values:

Values of 1-33 = low proportion of desired conditions

Values of 34-66 = moderate proportion of desired conditions

Values of 67-99 = high proportion of desired conditions

Common to All Alternatives:

Piñon-Juniper PNVTs: Desired vegetation and fire characteristics for the piñon-juniper PNVTs are expected to improve from moderate to high for juniper grasslands and from low to moderate for piñon-juniper evergreen shrub regardless of the range of restoration treatments proposed among all of the alternatives. In the long term, juniper grasslands would show high similarity to desired conditions with a generally open landscape appearance where trees occur as individuals, but occasionally in small groups. Open areas would be a mixture of widely scattered shrubs with a dense cover of grasses ansd forbs to support frequent surface fires. Piñon-juniper evergreen shrub vegetation characteristics would remain at a moderate similarity to desired conditions with many small groups and individual trees ranging from young to old and a moderate density of evergreen shrubs growing underneath. More area of closed canopy trees than desired would remain on the landscape.

Model results indicate that treating additional piñon-juniper evergreen shrub acres over and above those proposed in Alternative A would not increase the similarity to desired conditions that include high proportions of late-development open canopy trees, with low to moderate density evergreen shrubs growing underneath. Current vegetation conditions are such that eighty years is not enough time to grow and develop mature and old-age piñon and juniper trees that are desired across the landscape.

Interior Chaparral PNVT: Desired vegetation and fire characteristics of interior chaparral are expected to remain very similar to desired condition descriptions regardless of the range of restoration treatments proposed under all alternatives for both the short and long term. Between 89 and 93 percent of this PNVT would consist of shrubs that grow very closely together, five to eight percent would consist of grass and open shrubs, and the remainder would consist of grass and forb regeneration.

To address concerns about the proximity of interior chaparral vegetation to human developments, priority would be given to implementing thinning treatments within wildland urban interface areas to reduce the wildfire risk to people and structures.

Alternative A:

Grassland PNVTs**:** Semi-desert grasslands are expected to remain at low levels of similarity to vegetative desired conditions over the short term. Over the long term, vegetation structure and composition would improve to moderately similar to desired conditions. Continued encroachment by trees and shrubs are expected and would result in additional loss of perennial grass cover affecting vegetation density and canopy cover, plant composition, and fire behavior of this PNVT. In Great Basin grasslands, the structural characteristics of mostly grass and forbs with open canopy would remain near desired proportions in the short term, but would decline over the long term with little to no reintroduction of fire to the landscape.

Ponderosa Pine PNVTs: Short and long term desired condition similarity indices would be low to moderate for ponderosa pine-evergreen oak forests and low for ponderosa pine-Gambel oak forests. The majority of the ponderosa pine vegetation would remain as young to mature old forest with closed tree canopy cover, as opposed to the desired condition of high proportions of young and mature to old forest with widely separated trees and open canopy cover. Infrequent but

high severity fires including high tree mortality and increased risk to people and structures would remain as threats across the landscape.

Alternatives B/E and D:

***Grassland PNVTs*:** For semi-desert grasslands, the proposed range of restoration activity in Alternatives B/E and D is expected to result in moderate to high levels of similarity to vegetative desired conditions over the short term, and high levels of similarity in vegetation and fire characteritics over the long term. Expected trends in vegetation structure include increases in perennial bunchgrass cover and vigor and decreases in shrub density. Great Basin grassland conditions would remain stable, retaining its current high similarity to desired conditions over both the short and long term.

***Ponderosa Pine PNVTs**:* Under Alternatives B/E and D, desired condition similarity indices would be low to moderate for ponderosa pine-evergreen oak forests, similar to Alternative A. Landscape proportions of young and mature to old forest with widely separated trees and open canopy cover would improve to 27 percent from the current 3 percent. The desired proportion is 84 percent. For ponderosa pine-Gambel oak forests, the range of restoration activity proposed under Alternatives B/E and D is expected to result in a moderate level of similarity to vegetative desired conditions but only if implemented at the high end of the proposed treatment range and after 80 years or so. Landscape proportions of young and mature to old forest with widely separated trees and open canopy cover would improve to 16 percent from the current 1 percent. The desired proportion is 79 percent. Overall, Alternative B/E and D would result in higher proportions of desired conditions for the ponderosa pine vegetation types compared to Alternative A.

Alternative C:

***Grassland PNVTs*:** This alternative would restore the most grassland acres of any of the alternatives. For semi-desert grasslands, the similarity to desired conditions would be expected to change from low to high after only 10 years and this positive trend would continue over time. This is an increase in the rate of improvement toward desired conditions compared to Alternatives A, B/E and D. Great Basin grassland conditions are near desired conditions currently, but would still improve over both the short and long term under this alternative.

Ponderosa Pine PNVTs: Alternative C would restore the most ponderosa pine acres of any of the alternatives. Estimated similarity to desired conditions would be nearly the same as those in Alternative B/E for ponderosa pine-evergreen oak, but would improve somewhat for ponderosa pine-Gambel oak, and sooner than Alternatives A, B/E and D. A higher rate of reduction in occurrence of closely spaced trees with closed canopy and an increased occurrence of widely spaced trees with open canopy would be expected, especially if implemented at the upper end of the proposed treatment range.

Considering all PNVTs together**, Alternative C provides the most improvement in desired conditions**. Alternative A provides the least mount of improvement in desired conditions, and Alternatives B/E and D fall in the middle.

Open States (30% Canopy Cover or Less)

The amount of tree and shrub thinning and prescribed fire proposed under each alternative, influences the attainment of open vegetation states (defined as less than 30 percent canopy cover) by altering existing horizontal and vertical vegetation structure and spacing. The proportion of open states is an indicator of desired fire behavior, as open vegetation states promote surface fire, rather than active crown fire within woodland and forest vegetation types. Surface fires typically burn at lower intensities because they consume less biomass than crown fires, resulting in less mortality to live vegetation and less risk to life and property. This concept also applies to portions of grassland vegetation experiencing shrub and tree encroachment.

Computer models were used to determine the proportion of open state conditions expected in the short term (10 to 20 years) and long term (40 to 80 years) for each alternative compared to the desired proportions. For each of the PNVTs evaluated, table 5 displays the range of expected open state proportions at each time-step by Alternative. Details of this analysis are described in the sections that follow table 12.

Table 12. Percentage of Open State Conditions Expected by PNVT by Alternative.
The alternative providing the highest percentage of open states over time is shaded.

Semi-desert Grass

Open States = B Desired Amount = 80%

	Percentage of Open States Over Time		
Years	Alt A	Alt B/E,D	Alt C
0	20	20	20
10	23	30-44	**44-49**
20	26	41-64	**64-70**
40	33	57-82	**82-86**
80	35	61-84	**84-86**

Great Basin Grass

Open States = B,C Desired Amount = 93%

	Percentage of Open States Over Time		
Years	Alt A	Alt B/E,D	Alt C
0	80	80	80
10	86	86-86	**86-86**
20	87	88-88	**88-89**
40	90	90-91	**91-93**
80	93	94-95	**93-95**

Juniper Grass

Open States = B,C,D Desired Amount = 75%

	Percentage of Open States Over Time		
Years	Alt A	Alt B/E,D	Alt C
0	37	37	37
10	43	42-43	42-43
20	47	46-47	46-47
40	53	53-54	53-54
80	60	60-60	60-60

P-J Shrubland

Open States = B,C,D Desired Amount = 95%

	Percentage of Open States Over Time		
Years	Alt A	Alt B/E	Alt C/D
0	24	24	24
10	33	32-33	33-33
20	38	38-38	38-39
40	45	46-46	46-46
80	50	51-52	51-51

Pine-Evergreen Oak

Open States = C,D Desired Amount = 84%

	Percentage of Open States Over Time		
Years	Alt A	Alt B/E,D	Alt C
0	3	3	3
10	24	22-27	**22-29**
20	30	28-34	**28-35**
40	34	29-35	**30-36**
80	32	29-34	**28-34**

Pine-Gambel Oak

Open States = B,C,D,E,J,K Desired Amount = 83%

	Percentage of Open States Over Time		
Years	Alt A	Alt B/E,D	Alt C
0	3	3	3
10	17	18-22	**19-25**
20	23	24-29	**24-32**
40	28	30-34	**30-37**
80	31	32-36	**33-37**

Common to All Alternatives:

Piñon-Juniper PNVTs*:* All alternatives would create more open state conditions in piñon-juniper vegetation than currently exist, but at fairly low levels compared to the amount of desired open state conditions. More area of closed canopy trees and shrubs than desired would remain on the landscape negatively affecting vegetation density and canopy cover, plant composition, and fire behavior of this PNVT. These closed state conditions would increase the likelihood of damaging crown fires spreading to adjacent woodland and forest PNVTs.

Interior Chaparral PNVT: Interior chaparral is one of several mild-climate scrubland communities found within the Southwest. One of the unifying characteristics of these scrublands is an abundance of shrubs species with a tendency for dense, compact crowns; small, hard, thick, evergreen leaves, and deep wide-spreading root systems (Brown 1994). These shrub species are usually well adapted to fire, and reproduce prolifically from heat-scarified seed or sprout vigorously from enlarged root crowns. Closed-canopy conditions are ususually achieved in six to seven years post-fire. As such, the proportion of open states (or the lack there of) is not a reasonable indicator of fire behavior. Therefore, open state proportions were not evaluated for this PNVT.

Alternative A:

***Grassland PNVTs*:** Semi-desert grasslands would achieve only low levels of open canopy conditions under the proposed treatment levels of Alternative A. Current levels of prescribed fire treatments are not extensive enough to reduce the existing closed canopy states that shrub and tree encroachment has created over the last several decades. In Great Basin grasslands, the structural characteristics of mostly grass and forbs with open canopy would remain near desired proportions.

Ponderosa Pine PNVTs: Ponderosa pine dominated forests would achieve only low levels of open canopy conditions under the proposed treatment levels of Alternative A. This would result in a higher risk of uncharacteristic wildfire in the untreated areas where tree and shrub density is high.

Alternatives B/E and D:

***Grassland PNVTs*:** Semi-desert grasslands would achieve a range of open canopy conditions under Alternatives B/E and D. At the high end of the proposed treatment levels, open canopy conditions would be close to desired proportions. Prescribed fire treatments are expected to reduce the existing closed canopy states that have resulted from shrub and tree encroachment and to increase the proportions of grasses and forbs with open canopy. These open state conditions would increase the chance of surface fire versus crown fire occurrence within the grassland PNVTs and reduce the likelihood of crown fires spreading to adjacent woodland PNVTs. In Great Basin grasslands, the structural characteristics of mostly grasses and forbs with open canopy would remain near desired proportions, similar to Alternative A.

Ponderosa Pine PNVTs: Ponderosa pine dominated forests would achieve low levels of open canopy conditions at only slightly higher levels compared to Alternative A. The risk of uncharacteristic wildfire in untreated areas where tree and shrub density is high would remain.

Alternative C:

***Grassland PNVTs*:** Semi-desert grasslands would achieve the same or higher levels of open canopy conditions under Alternative C compared to Alternatives B/E and D. At the high end of the proposed treatment levels, open canopy conditions would be close to desired proportions. In Great Basin grasslands, the structural characteristics of mostly grasses and forbs with open canopy would remain near desired proportions, similar to Alternatives A, B/E and D. Higher

proportions of open state conditions lessens the threat of damaging crown fires in grassland ecosystems that are adapted to frequent surface fires.

Ponderosa Pine PNVTs: Alternative C would create the highest proportion of open state conditions compared to Alternatives A, B/E and D but the difference between Alternatives B/E, D and C are slight. The increased fuel reduction and prescribed fire activity proposed under Alternative C would improve vegetation characteristics by reducing the amount of closed canopy conditions, and more frequent, low intensity fire disturbance would help remove fuels to avoid large, high intensity wildfires.

Fire Frequency

For each alternative, estimates of future fire frequency were calculated using the total area of each PNVT divided by the high end amount of prescribed fire acres proposed. This produces an estimate of how long it would take to burn each acre in the PNVT once given the prescribed fire application rate (acres/year). The fire frequency will vary depending on annual prescribed fire rates and the size of the PNVT. An example equation is shown below.

Fire frequency example equation:

- ***PNVT area of 100,000 acres/10,000 acres prescribed fire per year = a fire frequency of once every 10 years, or 1:10 years.***

Common to All Alternatives:

Interior Chaparral PNVT: Proposed restoration treatments under all alternatives would create and maintain fire frequencies that are within the desired range for interior chaparral ecosystems.

Alternative A:

***Grassland PNVTs*:** Estimated fire frequencies under this alternative would be about 10 times less often than these arid grassland systems are ecologically adapted to. Managed livestock grazing in these PNVTs is helpful for reducing herbaceous fuels loads but is less effective at reducing and maintaining desired woody fuel levels. The lack of frequent fire in grasslands also precludes regular nutrient cycling between above ground organic material and the soil and roots of living plants affecting plant productivity.

Piñon-Juniper PNVTs: Estimated fire frequencies under this alternative would be about six times less often than desired for juniper grasslands and two to six times less often than desired for piñon-juniper evergreen shrub vegetation. With limited reintroduction of fire in the piñon-juniper PNVTs, there are some lost opportunities to reduce undesired tree and shrub density and canopy cover levels, and to create openings for the establishment and growth of perennial grasses and forbs.

Ponderosa Pine PNVTs: Estimated fire frequencies under Alternative A would be four to seven times less often than desired for ponderosa pine-evergreen oak forests and eight times less often than desired for ponderosa pine-Gambel oak forests.With limited reintroduction of fire in the ponderosa pine PNVTs, there are lost opportunities to reduce undesired tree and shrub density

and canopy cover levels, and to create openings for the establishment and growth of grasses and forbs.

Alternatives B/E and D:

***Grassland PNVTs*:** Estimated fire frequencies under Alternatives B/E and D would be fairly close to desired levels for semi-desert grasslands and about five times more frequent for the Great Basin grasslands than Alternative A. Some potential but uncertain consequences of prescribed fire treatments may occur related to whether or not: 1) sufficient coordination with grazing permittees leads to desired fuel levels both pre- and post-fire treatment; and 2) post-fire precipitation is adequate to encourage grass recovery and restore ground cover for inhibition of invasive plant species.

Piñon-Juniper PNVTs: Fire frequencies for the piñon-juniper PNVTs under Alternatives B/C/D/E would be closer to desired levels than under Alternative A, but still up to three times less often than desired for the juniper grasslands. Alternatives B/E and D best approximate the desired frequencies for the piñon-juniper evergreen shrub vegetation, but this fire characteristic is achieved at the expense of no additional improvement in the desired vegetation characteristics described above.

Ponderosa Pine PNVTs: Under Alternatives B/E and D, ponderosa pine-evergreen oak forests would achieve a fire frequency within the desired range of every 6 to 12 years. Ponderosa pine-Gambel oak forests would experience fire three times less often than desired.

Alternative C:

***Grassland PNVTs*:** Restoration treatments proposed under Alternative C would create and maintain fire frequencies that most closely resemble desired fire frequencies for the grassland PNVTs found on the Prescott NF. The uncertainties associated with the timing and coordination of prescribed fire treatments for Alternative B/E and D also apply to Alternative C.

Ponderosa Pine PNVTs: Under Alternative C, ponderosa pine-evergreen oak forests would achieve a fire frequency within the desired range of every 6 to 12 years, similar to Alternatives B/E and D. Ponderosa pine-Gambel oak forests would experience fire only two times less often than desired. Alternative C best approximates the desired frequencies for the ponderosa pine PNVTs.

Climate Change Consequences

Proposed treatments for each Alternative were evaluated for probable vegetation responses assuming these hotter, drier environmental conditions:

- Temperatures are expected to increase 0.5 degrees F per decade
- There will be more hot days with summer heat waves lasting 2 weeks or longer
- Precipitation may decrease
- Winters will be warmer with reduced snow pack and monsoon rains may start later.
- Extreme events, such as floods, may become more common.

Common to all Alternatives:

The sustainability of several terrestrial ecosystems on the Prescott NF is at risk (especially for the grasslands and ponderosa pine PNVTs) and restoring their health and function is key to strengthening their resilience. In the coming years, it is expected that the Southwest will experience a shift in climatic conditions. Mean annual temperatures could increase 0.5 degrees Fahrenheit per decade and summer heat waves could last two weeks or more. Winter temperatures would also be warmer, with a corresponding reduced snow pack. Overall, precipitation could decrease. Monsoon rains could arrive later in the summer, and a greater percentage of the precipitation could arrive in the form of high-intensity rain events (Forest Service, 2010a).

Indirectly, increasing temperatures, water shortages, and changing vegetative conditions will likely affect biodiversity, and put pressure on plant and animal populations, distribution, viability, and migration patterns.

Under warmer and dryer climate conditions, the terrestrial ecosystems found on the Prescott NF would be susceptible to decreases in plant productivity from water limitations and increased heat; increases in insect attacks; colonization of invasive plant species; longer and more severe fire seasons; and changes in the timing, intensity and frequency of other ecological disturbances (e.g., droughts, flash flooding, landslides, wind storms).

Grasses make use of moisture in the upper soil layers. Intense precipitation events may lead to increased run-off, but decreased effective water infiltration (McAuliffe 2003). This could decrease vigor of native plants and lead to increased colonization of non-native invasive plant species.

Climate change is anticipated to shift the geographic range of several tree and shrub species northward and upwards in elevation (Shafer et al. 2001). There may be increasing challenges to the regeneration of ponderosa pine trees within their current range, especially on warmer, drier areas such as south facing slopes. It is possible that there may be some shifts in distribution between the three piñon-juniper PNVTs depending on amount and timing of precipitation and site specific conditions such as terrain and soils. In addition, the abundance and distribution of piñon trees may decrease from increased insect attack or lack of moisture. Insects and disease outbreaks, drought, and other stressors accompanying climate change may have future roles as large-scale disturbances which may result in type conversions or the creation of new PNVTs across the landscape (Fulé 2008).

Hotter and drier environments are expected to increase the occurrence of wildfire as well as enhance their size and severity (Westerling et al 2006). Increasing the amount of vegetation and fire characteritics that are adapted to a more fire prone environment would enhance ecosystem resilience landscape-wide.

Restoration treatments that create more open conditions would enhance individual plant resilience to natural and human stressors, encourage persistence of native vegetation, and facilitate ecosystem transition from current to new climate conditions (Millar et al. 2007).

Alternative A:

Under the direction of the current plan, ecosystem resilience to climate change would not likely be emphasized. Ecosystems would continue to show some improvement in similarity to desired conditions, but the improvements would be at greater risk of reversing due to the direct and indirect effects of climate change identified above. Alternative A provides the least amount of ecosystem resilience and capacity for plant communities to adapt to changing climate and a less aggressive strategy for treating non-native invasive plants.

Alternatives B/E and D:

Under Alternatives B/E and D, the increased prescibed fire activity in the grassland ecosystems is expected to discourage shrubby vegetation and encourage bunchgrasses. Nutrient cycling would also be enhanced. Tree and shrub thinning and prescribed fire activity in the ponderosa pine ecosystems would produce more of the desired structure and composition characteristics than Alternative A. The more frequent application of prescribed surface fires compared to alternative A would help remove fuels and reduce the threat of large, destructive wildfires on the landscape. Alternatives B/E and D would also provide a more aggressive approach to controlling non-native invasive plants than Alternative A.

Alternative C:

Alternative C would implement the quickest rate of improvement in desired vegetation and fire characteritisc and strengthening ecosystem resilience, due to its emphasis on vegetation management and ecosystem restoration. Alternative C would provide increased ecosystem resilience within the grassland and ponderosa pine PNVTs compared to the other alternatives because of the higher restoration treatment activities proposed. Alternative C contains the same direction for controlling non-native invasive plants as Alternatives B/E and D. Alternative C proposes an additional guideline requiring increased activity limitations within the Verde Formation. This would be expected to increase resiliency and reduce the likelihood of impact on plants associated with that geophysical formation.

Cumulative Environmental Consequences

The cumulative consequences analysis area for this report is identified using the National Ecological Unit Hierarchy (Cleland and others 1997). This system divides the United States into Domains, then Divisions, and then further divides them into Provinces and Sections. Sections are described by broad areas of similar geomorphic process, stratigraphy, geologic origin, drainage networks, topography, regional climate, and potential natural vegetation groups. Sections are useful ecological units for strategic, statewide, multi-forest, and multi-agency analysis and assessment (Cleland and others 1997).

As shown in table 13, almost the entire Prescott NF (92 percent) is located in the Tonto Transition section of the Colorado Plateau Semi-Desert province. The remaining portion (eight percent) is shared between the Mojave Desert and the White Mountains-San Francisco Peaks-Mongollon Rim ecological sections. Therefore, analysis of cumulative consequences of the proposed alternatives is based on current or foreseeable land management activities within the Tonto

Transition section. Consequences considered include current as well as potential future activities or management strategies.

Table 13. Proportion of PNF lands within the ecological sections found in central Arizona.

Ecological Section Name	Section	PNF Percent	PNF Acres	Off-Forest	Total Acres in Section
Tonto Transition	313C	15.3%	1,152,514	6,402,655	7,555,169
White Mountains-San Francisco Peaks-Mogollon Rim	M313A	0.5%	69,386	13,405,710	13,475,096
Mojave Desert	322A	0.1%	34,019	33,342,888	33,376,908

Data are from the Southwest Regional Gap Analysis Project (USGS 2004).

Tonto Transition Ecological Section Consequences

The Tonto Transition section occupies more than 7.5 million acres of central Arizona (USGS 2004) with several large portions owned or managed by Federal, State, and tribal governments. Those with the largest ownerships include the Bureau of Land Management (Aqua Fria National Monument and Bradshaw-Harquahala Resource Area), the US Forest Service (Coconino NF, Prescott NF, and Tonto NF), Arizona State Land Department, and the San Carlos Apache and the White Mountain Apache Tribes (ASLD 2011, Bureau of Land Management 2011; Intertribal Council of Arizona, Inc. 2011).

State Trust lands are managed by the State of Arizona to benefit the K-12 public school system (ASLD 2011). These lands are scattered throughout the State including the Tonto Transition section, often in a checkerboard pattern. Most of Arizona Trust lands are currently usable only for livestock grazing purposes. The current and future levels of vegetation and fire treatment activity contributed by the State are low and are not expected to be cumulative over the next ten years within the Section.

The San Carlos Apache and the White Mountain Apache Tribes manage for rangeland, recreation, timber, and wildlife values on their respective reservations that total 3.4 million acres (Intertribal Council of Arizona, Inc. 2011). Many of their on-going vegetation treatment activities are focused on restoring the fire-damaged landscapes from the 2002 Rodeo-Chediski Fire. Approximately 60 percent (281,000 acres) of the total fire area is located on the White Mountain Apache Reservation. Within the fire perimeter is an intermingling of chaparral, piñon-juniper woodlands, and ponderosa pine forests. About one-half of the total burn area experienced high-severity fire, other areas burned at low- to medium severity, and still other areas are unburned (Neary and others 2009). Over the long-term, burned area rehabilitation efforts are beneficial for improving vegetative and soil conditions within the affected watersheds and for moving the entire Tonto Transition section closer to desired ecological conditions.

Two BLM resource management plans cover 967,000 acres within the Section (Bureau of Land Management 2011). These plans call for rangeland and riparian management activities that maintain or protect desired characteristics of plant communities for the value they provide to wildlife. These activies and strategies are focused on the semi-desert grassland and Sonoran desert (cactus) communities.

In addition to the Prescott NF, Forest Service activities within the Section include the Tonto NF and the Red Rocks and Mogollon Rim ranger districts of the Coconino NF. The Tonto NF proposes more than 136,000 acres of fuel reduction and prescribed fire treatments over the next ten years to reduce fire risk (USFS 2011c). The Red Rocks and Mogollon Rim ranger districts of the Coconino NF are part of the Four Forest Restoration Initiative (USFS 2011a) that proposes to restore 750,000 acres of ponderosa pine ecosystem over approximately ten years using a combination of tree thinning and prescribed fire activities on lands north and east of the Prescott NF.

Cumulative consequences are those consequences of foreseeable activities on non-Prescott NF lands that, in conjunction with management activities likely to occur on the Prescott NF, may intensify, negate, improve or otherwise affect the vegetation types and species' habitats of the Prescott NF. Below are considerations of consequences of activities that will likely occur on adjacent or nearby ownerships to the Prescott NF.

Reducing Fuel Loads

Research has shown that most pine forests in the Southwest are at much higher risk of high intensity and severe fire than they were prior to European settlement. Several large, destructive wildfires in Arizona over the past several years have highlighted the interest and need to modify the structure, composition, and fuel load of several vegetation types on tribal, Bureau of Land Management, and Forest Service lands. The restoration of these landscapes was initiated after the Rodeo-Chediski Fire [2002] and will likely continue into the future, considering more recent large-scale wildfires including the Willow Fire [2004], the Cave Creek Complex [2005], and the Wallow Fire [2011] that each burned hundreds of thousands of acres of vegetation and habitat that is adjacent to or similar to that found on the Prescott NF.

Restoring Desired Vegetation Structure and Composition

Two national forests adjacent to the Prescott NF are proposing to carry out landscape-scale restoration of ponderosa pine forests in northern Arizona. Restoration activities include the thinning of trees, prescribed fire treatments, and watershed and road restoration within 988,764 acres of the Coconino and Kaibab national forests. Proposed treatments include more than 205,000 acres of prescribed fire treatments and more than 388,000 acres of thinning and watershed restoration treatments (Forest Service 2011xy).

Common to all Alternatives:

Reducing fuel loads and modifying vegetation structure and composition would have cumulative environmental consequences that would likely be as follows:

• moving vegetation structure and diversity towards desired conditions by creating a mosaic of interspaces and tree groups of varying sizes and shapes

• moving towards desired conditions for vegetation diversity and composition by maintaining and promoting Gambel oak, aspen, and perennial grasses

• moving towards the desired condition of having a resilient forest by reducing the potential for undesirable fire behavior and its effects

• moving towards the desired condition of maintaining the mosaic of tree groups and interspaces with frequent, low-severity fire by having a forest structure that does not support wide-spread crown fire

• improving forest health by reducing the potential for stand density-related mortality and by reducing the level of insect attacks and tree pathogens

• moving towards a forest structure with all age and size classes represented to maintain northern goshawk and Mexican spotted owl habitat

Alternative C:

Alternative C is expected to have the highest beneficial cumulative consequences because it proposes the highest amount of restoration activity in the most highly departed vegetation types (ponderosa pine and grassland PNVTs). Alternatives B/E and D would have moderate cumulative consequences, and Alternative A would have the lowest.

Unavoidable Adverse Impacts; Irreversible and Irretrievable Commitment of Resources

The land management plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carryout any project or activity. Before any ground-disturbing actions take place, they must be authorized in a subsequent site-specific environmental analysis. Therefore none of the alternatives cause unavoidable adverse impacts. Mechanisms are in place to monitor and use adaptive management principles in order to help alleviate any unanticipated impacts that need to be addressed singularly or cumulatively.

Because the land management plan does not authorize or mandate any site-specific project or activity (including ground-disturbing actions), none of the alternatives cause an irreversible or irretrievable commitment of resources.

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Appendix A – VDDT model inputs/results

Includes the following summary spreadsheets:

- Calculating Desired Conditions Similarity Index
  - Alternative A – VDDT Results
  - Alternative B – VDDT Results
  - Alternative C – VDDT Results
  - Alternative D – VDDT Results

- Graphical Comparisons of Current and Desired Conditions by PNVT

Semi-Desert Grassland PNVT

Great Basin Grassland PNVT

Juniper Grassland PNVT

Piñon-Juniper Evergreen Shrub PNVT

Interior Chaparral PNVT

Ponderosa Pine-Evergreen Oak PNVT

Ponderosa Pine-Gambel Oak PNVT

Piñon-Juniper Woodland PNVT

Desert Communities PNVT

Riparian Gallery Forest PNVT

Calculating the Desired Conditions Similarity Index Value:

Ponderosa pine - evergreen oak PNVT example

The "desired conditions similarity index value" is a useful numeric that represents the relative similarity between a given set of "current vegetative conditions" and "desired vegetative conditions".

The Index Value is measured on a scale of 1 to 100 with 100 representing maximum similarity.

The concept parallells the ecological condition class (ECC) values computed during the ESR analyses, where relative departure was expressed on a scale of 1 to 100.

This time, the focus is on similarity rather than departure from desired conditions.

These two concepts share an inverse relationship .

To calculate: For each vegetation state, the lesser value (current proportion vs. desired proportion) is recorded and then summed across vegetation states for a total. values of 1-33 = low similarity; 34-66 = moderate similarity; and 67-99 = high similarity to desired proportions/conditions.

EXAMPLE:

The table below displays the PNVT states and class proportions for ponderosa pine-evergreen oak PNVT.

The numbers shown in red, represent the lower value (between the current and desired condition values of each state) that was used to calculate the Desired Conditions Index Value.

VDDT Results	PNVT State/Class Proportions: A	B	C	D	E	F	G	Desired Conditions Index Value & Label
Desired	4	3	24	60	4	5		
Current	12	47	1	2	35	3		
	4	3	1	2	4	3		17 Low
Desired	4	3	24	60	4	5		
YR 10	6	34	6	18	30	6		
	4	3	6	18	4	5		40 Moderate
Desired	4	3	24	60	4	5		
YR20	4	27	6	24	29	10		
	4	3	6	24	4	5		46 Moderate
Desired	4	3	24	60	4	5		
YR 40	2	22	6	28	27	15		
	2	3	6	28	4	5		50 Moderate
Desired	4	3	24	60	4	5		
YR 80	2	21	5	27	28	17		
	2	3	5	27	4	5		48 Moderate

VDDT Results – Alternative A

Semi-desert Grassland PNVT:
Alternative A: No Action

VDDT Modelling Conditions & Results						Alternative A: No Action			
Semi-Desert Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	24	76	0	0					
Desired	10	80	5	5					
Current	1	20	49	30				31	
YR 00	1	20	49	30				31	Low
YR 10	2	23	38	37				35	
YR 20	2	26	30	42				38	Low
YR 40	2	33	18	47				45	Low
YR 80	2	35	21	41	1			47	Moderate
	* Contemporary landscapes only - invasive plants state								

Great Basin Grassland PNVT:
Alternative A: No Action

VDDT Modelling Conditions & Results						Alternative A: No Action			
Colorado Plateau/Great Basin Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	5	73	20	2					
Desired	5	73	20	2					
Current	6	56	24	14				83	High
YR 00	6	56	24	14				83	High
YR 10	1	53	33	13				76	High
YR 20	1	48	39	11				71	High
YR 40	1	43	47	9				66	Moderate
YR 80	1	44	49	6				67	Moderate

Juniper Grasslands PNVT:

Alternative A: No Action

VDDT Modelling Conditions & Results							Alternative A: No Action		
Juniper Grasslands									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	25	B	50	B	10	10		
Desired	5	25	B	50	B	10	10		
Current	43	1	15	21	0	3	17	55	Moderate
YR 00	43	1	15	21	0	3	17	55	Moderate
YR 10	37	1	11	31	0	4	16	62	Moderate
YR 20	32	1	9	37	0	4	17	66	Moderate
YR 40	25	1	6	46	0	3	19	71	High
YR 80	17	1	4	55	0	2	21	72	High
	*The desired proportion of states C and E is combined with B for a total of 25%.								

Pinyon-Juniper Evergreen Shrub PNVT:
Alternative A: No Action

VDDT Modelling Conditions & Results							Alternative A: No Action		
Pinyon-juniper Evergreen Shrub									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	55	B	40	B	0	0		
Desired	5	55	B	40	B	0	0		
Current	27	1	9	14	0	12	37	29	Low
YR 00	27	1	9	14	0	12	37	29	Low
YR 10	21	2	8	23	0	11	35	38	Moderate
YR 20	17	2	8	28	0	10	35	43	Moderate
YR 40	11	2	7	36	0	9	35	50	Moderate
YR 80	6	1	6	43	0	9	35	55	Moderate
	*The desired proportion of states C and E is combined with B for a total of 55%.								

Ponderosa Pine - Evergreen Oak PNVT:
Alternative A: No Action

VDDT Modelling Conditions & Results							Alternative A: No Action		
Ponderosa pine - evergreen oak									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	4	3	24	60	4	5			
Desired	4	3	24	60	4	5			
Current	12	47	1	2	35	3		17	Low
YR 00	12	47	1	2	35	3		17	Low
YR 10	6	34	6	18	30	6		40	Moderate
YR 20	4	27	6	24	29	10		46	Moderate
YR 40	2	22	6	28	27	15		50	Moderate
YR 80	2	21	5	27	28	17		48	Moderate

Ponderosa Pine - Gambel Oak PNVT:
Alternative A: No Action

VDDT Modelling Conditions & Results							Alternative A: No Action	
Ponderosa pine - Gambel Oak - conifer PNVT								
VDDT	**PNVT State/Class Proportions:**						**Desired Conditions**	
Results	**A/N**	**B,F**	**C**	**D,J/E,K***	**G**	**H,L,I,M***	**Index Value & Label**	
Reference	0	2	2	79	2	15		
Desired	0	2	2	79	2	15		
Current	6	2	0	1	37	54	20	Low
YR 00	6	2	0	1	37	54	20	Low
YR 10	1	10	1	6	30	52	26	Low
YR 20	0	14	1	8	27	50	28	Low
YR 40	0	17	1	10	24	48	30	Moderate
YR 80	0	16	1	14	23	46	34	Moderate
	* states J,K,L,M are multi-story and do not currently occur on the PNF.							

Interior Chaparral PNVT:
Alternative A: No Action
VDDT Modelling Conditions & Alternative A: No

VDDT Results	PNVT State/Class Proportions: A	B	C & D		E	F	G	Desired Conditions Index Value & Label
Reference	2	5	93					
Desired	5	10	85					
Current	1	4	95					90 High
				C D				
YR 00	1	4	95	(73 & 22)				90 High
YR 10	2	5	93	(44 & 49)				92 High
YR 20	2	5	93	(18 & 75)				92 High
YR 40	2	5	93	(17 & 76)				92 High
YR 80	2	5	93	(17 & 76)				92 High

VDDT Results – Alternative B

Semi-desert Grassland PNVT:
Alternative B low:

VDDT Modelling Conditions & Results — Alternative B/D: Low End

Semi-Desert Grassland PNVT

VDDT Results	PNVT State/Class Proportions: A	B	C	D	E*	F	G	Desired Conditions Index Value & Label	
Reference	24	76	0	0					
Desired	10	80	5	5					
Current	1	20	49	30				31	Low
YR 00	1	20	49	30				31	Low
YR 10	4	30	34	32				44	Moderate
YR 20	4	41	23	32				55	Moderate
YR 40	3	57	11	28	1			70	High
YR 80	3	61	19	15	2			74	High

* Contemporary landscapes only - invasive plants state

Modelled Activities:	Avg. Annual Activity	PNVT acres	Prob/yr	
Mixed Severity Fire	152 ac/yr	125,712	0.0012	
Replacement Fire	266 ac/yr	125,712	0.0021	
Rx Burning	2,500 ac/yr	124,455	0.02	(states B,C,D only)

Semi-desert Grassland PNVT:
Alternative B high:

VDDT Modelling Conditions & Results						Alternative B/D: High End			
Semi-Desert Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	24	76	0	0					
Desired	10	80	5	5					
Current	1	20	49	30				31	Low
YR 00	1	20	49	30				31	Low
YR 10	8	44	25	23				62	Moderate
YR 20	7	64	12	16	1			81	High
YR 40	7	82	3	7	1			97	High
YR 80	6	84	7	1	2			92	High
	* Contemporary landscapes only - invasive plants state								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		152 ac/yr		125,712		0.0012			
Replacement Fire		266 ac/yr		125,712		0.0021			
Rx Burning		6,500 ac/yr		124,455		0.052	(states B,C,D only)		

Great Basin Grassland PNVT:
Alternative B low:

VDDT Modelling Conditions & Results							Alternative B/D: Low End		
Colorado Plateau/Great Basin Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	5	73	20	2					
Desired	5	73	20	2					
Current	6	56	24	14				83	High
YR 00	6	56	24	14				83	High
YR 10	2	54	32	12				78	High
YR 20	1	50	38	11				73	High
YR 40	2	46	44	8				70	High
YR 80	1	49	45	5				72	High
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		35 ac/yr		38,389		0.0009			
Replacement Fire		0 ac/yr		38,389		0			
Rx Burning		100 ac/yr		36,086		0.0028	(states B,C,D only)		

Great Basin Grassland PNVT:
Alternative B high:

VDDT Modelling Conditions & Results							Alternative B/D: High End		
Colorado Plateau/Great Basin Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	5	73	20	2					
Desired	5	73	20	2					
Current	6	56	24	14				83	High
YR 00	6	56	24	14				83	High
YR 10	3	56	30	11				81	High
YR 20	3	56	32	9				81	High
YR 40	3	58	33	6				83	High
YR 80	3	60	35	2				85	High
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		35 ac/yr		38,389		0.0009			
Replacement Fire		0 ac/yr		38,389		0			
Rx Burning		500 ac/yr		36,086		0.014	(states B,C,D only)		

Juniper Grasslands PNVT:
Alternative B low:

VDDT Modelling Conditions & Results							Alternative B,C,D: Low End		
Juniper Grasslands									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	25	B	50	B	10	10		
Desired	5	25	B	50	B	10	10		
Current	43	1	15	21	0	3	17	55	Moderate
YR 00	43	1	15	21	0	3	17	55	Moderate
YR 10	37	1	11	30	0	4	17	61	Moderate
YR 20	33	1	8	37	0	4	17	65	Moderate
YR 40	25	1	6	46	0	3	19	71	High
YR 80	17	1	5	54	0	2	21	73	High
	*The desired proportion of states C and E is combined with B for a total of 25%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Nonlethal Fire		105 ac/yr		137,274		0.0008			
Mixed Severity Fire		39 ac/yr		137,274		0.0003			
B Free Thin All Sizes		150 ac/yr		23,387		0.0064	state G only		
Rx Surface Fire		500 ac/yr		78,246		0.0064	not state A		
Rx Mixed Fire		0 ac/yr		78,246		0	not state A		

Juniper Grasslands PNVT:
Alternative B high:

VDDT Modelling Conditions & Results						Alternative B,C,D: High End			
Juniper Grasslands									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	25	B	50	B	10	10		
Desired	5	25	B	50	B	10	10		
Current	43	1	15	21	0	3	17	55	Moderate
YR 00	43	1	15	21	0	3	17	55	Moderate
YR 10	37	1	11	31	0	4	16	62	Moderate
YR 20	33	1	8	38	0	4	16	66	High
YR 40	26	1	7	46	0	3	17	72	High
YR 80	20	1	4	54	0	2	19	72	High
	*The desired proportion of states C and E is combined with B for a total of 25%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Nonlethal Fire		105 ac/yr		137,274		0.0008			
Mixed Severity Fire		39 ac/yr		137,274		0.0003			
B Free Thin All Sizes		200 ac/yr		23,387		0.0086	state G only		
Rx Surface Fire		800 ac/yr		78,246		0.01	not state A		
Rx Mixed Fire		0 ac/yr		78,246		0	not state A		

Pinyon-Juniper Evergreen Shrub PNVT:
Alternative B low:

VDDT Modelling Conditions & Results							Alternative B,C,D: Low End		
Pinyon-juniper Evergreen Shrub									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	55	B	40	B	0	0		
Desired	5	55	B	40	B	0	0		
Current	27	1	9	14	0	12	37	29	Low
YR 00	27	1	9	14	0	12	37	29	Low
YR 10	21	2	8	23	0	10	36	38	Moderate
YR 20	16	2	8	28	0	10	36	51	Moderate
YR 40	11	2	8	36	0	9	35	51	Moderate
YR 80	5	1	7	43	0	9	35	56	Moderate
	*The desired proportion of states C and E is combined with B for a total of 55%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Surface Fire		155 ac/yr		463,296		0.0003			
Mixed Severity Fire		196 ac/yr		463,296		0.0004			
B Free Thin All Sizes		150 ac/yr		227,015		0.0007	states F,G only		
Rx Surface Fire		1,200 ac/yr		338,206		0.0035	not state A		
Rx Mixed Fire		0 ac/yr		227,015		0	states E,F,G only		

Pinyon-Juniper Evergreen Shrub PNVT:
Alternative B high:

VDDT Modelling Conditions & Results							Alternative B: High End		
Pinyon-juniper Evergreen Shrub									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	55	B	40	B	0	0		
Desired	5	55	B	40	B	0	0		
Current	27	1	9	14	0	12	37	29	Low
YR 00	27	1	9	14	0	12	37	29	Low
YR 10	25	2	8	22	0	10	33	37	Moderate
YR 20	23	2	8	28	0	9	30	43	Moderate
YR 40	20	2	8	36	0	8	26	51	Moderate
YR 80	17	2	8	42	0	7	24	57	Moderate
	*The desired proportion of states C and E is combined with B for a total of 55%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Surface Fire		155 ac/yr		463,296		0.0003			
Mixed Severity Fire		196 ac/yr		463,296		0.0004			
B Free Thin All Sizes		2,000 ac/yr		227,015		0.009	states F,G only		
Rx Surface Fire		6,000 ac/yr		338,206		0.018	not state A		
Rx Mixed Fire		0 ac/yr		227,015		0	states E,F,G only		

Ponderosa Pine - Evergreen Oak PNVT:
Alternative B low:

VDDT Modelling Conditions & Results							Alternative B&D: low end		
Ponderosa pine - evergreen oak									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	4	3	24	60	4	5			
Desired	4	3	24	60	4	5			
Current	12	47	1	2	35	3		17	Low
YR 00	12	47	1	2	35	3		17	Low
YR 10	6	33	6	16	33	6		38	Moderate
YR 20	4	25	7	21	33	10		44	Moderate
YR 40	3	20	5	24	34	14		45	Moderate
YR 80	2	19	5	24	34	16		45	Moderate
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		63 ac/yr		63,539		0.001		
	Mixed Severity Fire		78 ac/yr		63,539		0.0012		
	Stand Replacing Fire		16 ac/yr		63,539		0.0003		
	Rx Surface Fire		2,000 ac/yr		31,770		0.063	states B,C,D,E only	
	B Free Thin All Sizes		25 ac/yr		29,863		0.0008	state B only	
	E Group Select w/ Matrix		100 ac/yr		22,239		0.0045	state E only	

Ponderosa Pine - Evergreen Oak PNVT:
Alternative B high:

VDDT Modelling Conditions & Results							Alternative B&D: high end		
Ponderosa pine - evergreen oak									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	4	3	24	60	4	5			
Desired	4	3	24	60	4	5			
Current	12	47	1	2	35	3		17	Low
YR 00	12	47	1	2	35	3		17	Low
YR 10	7	30	8	19	29	7		43	Moderate
YR 20	6	21	8	26	27	12		50	Moderate
YR 40	6	16	6	29	26	17		51	Moderate
YR 80	6	16	6	28	25	19		50	Moderate
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		63 ac/yr		63,539		0.001		
	Mixed Severity Fire		78 ac/yr		63,539		0.0012		
	Stand Replacing Fire		16 ac/yr		63,539		0.0003		
	Rx Surface Fire		4,000 ac/yr		31,770		0.126	states B,C,D,E only	
	B Free Thin All Sizes		100 ac/yr		29,863		0.0033	state B only	
	E Group Select w/ Matrix		300 ac/yr		22,239		0.013	state E only	

Ponderosa Pine - Gambel Oak PNVT:
Alternative B low:

VDDT Modelling Conditions & Results							Alternative B,D: Low End		
Ponderosa pine - Gambel Oak - conifer PNVT									
VDDT	**PNVT State/Class Proportions:**						**Desired Conditions**		
Results	**A/N**	**B,F**	**C**	**D,J/E,K***	**G**	**H,L,I,M***	**Index Value & Label**		
Reference	0	2	2	79	2	15			
Desired	0	2	2	79	2	15			
Current	6	2	0	1	37	54	20	Low	
YR 00	6	2	0	1	37	54	20	Low	
YR 10	2	10	1	7	29	51	27	Low	
YR 20	0	15	1	8	26	50	28	Low	
YR 40	0	18	1	11	23	47	31	Moderate	
YR 80	0	17	1	14	23	45	34	Moderate	
	* states J,K,L,M are multi-story and do not currently occur on the PNF.								
	Alternative A: No Action								
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		266 ac/yr		49,052		0.0054		
	Mixed Severity Fire		168 ac/yr		49,052		0.0034		
	Stand Replace Fire		7 ac/yr		49,052		0.0001		
	Rx Surface Fire		500 ac/yr		46,109		0.012	not state A	
	B Free Thin All Sizes		25 ac/yr		18,149		0.0014	state G only	
	E Group Select w/ Matrix		100 ac/yr		26,488		0.0038	states H,I only	

Ponderosa Pine - Gambel Oak PNVT:
Alternative B high:

VDDT Modelling Conditions & Results							Alternative B,D: High End		
Ponderosa pine - Gambel Oak - conifer PNVT									
VDDT	**PNVT State/Class Proportions:**						**Desired Conditions**		
Results	**A/N**	**B,F**	**C**	**D,J/E,K***	**G**	**H,L,I,M***	**Index Value & Label**		
Reference	0	2	2	79	2	15			
Desired	0	2	2	79	2	15			
Current	6	2	0	1	37	54	20	Low	
YR 00	6	2	0	1	37	54	20	Low	
YR 10	2	11	2	9	28	48	30	Low	
YR 20	1	17	1	11	24	46	31	Low	
YR 40	0	20	1	13	23	43	33	Moderate	
YR 80	0	19	1	16	22	42	36	Moderate	
	* states J,K,L,M are multi-story and do not currently occur on the PNF.								
	Alternative A: No Action								
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		266 ac/yr		49,052		0.0054		
	Mixed Severity Fire		168 ac/yr		49,052		0.0034		
	Stand Replace Fire		7 ac/yr		49,052		0.0001		
	Rx Surface Fire		1,000 ac/yr		46,109		0.022	not state A	
	B Free Thin All Sizes		100 ac/yr		18,149		0.0055	state G only	
	E Group Select w/ Matrix		300 ac/yr		26,488		0.011	states H,I only	

Interior Chaparral PNVT:
Alternative B low:

VDDT Modelling Conditions & Results

Alternative B/C/D: low end

Interior Chaparral PNVT

VDDT Results	PNVT State/Class Proportions: A	B	C & D		E	F	G	Desired Conditions Index Value & Label
Reference	2	5	93					
Desired	5	10	85					
Current	1	4	95					90 High
				C D				
YR 00	1	4	95	(73 & 22)				90 High
YR 10	3	7	90	(44 & 46)				95 High
YR 20	3	8	89	(24 & 65)				96 High
YR 40	3	7	90	(23 & 67)				95 High
YR 80	3	8	90	(23 & 66)				96 High

Modelled Activities:	Avg. Annual Activity	PNVT acres	Prob/yr	
Mixed Severity Fire	38 ac/yr	315,445	0.0001	
Stand Replace Fire	1,302 ac/yr	315,445	0.0041	
Rx Burning	3,800 ac/yr	299,673	0.013	(states C & D only)
Mastication	200 ac/yr	299,673	0.0007	(states C & D only)
Biomass Removal	0 ac/yr	299,673	0	

Interior Chaparral PNVT:
Alternative B high:

VDDT Modelling Conditions & Results — Alternative B: High End

Interior Chaparral PNVT

VDDT Results	PNVT State/Class Proportions: A	B	C & D		E	F	G	Desired Conditions Index Value & Label
Reference	2	5	93					
Desired	5	10	85					
Current	1	4	95					90 High
				C D				
YR 00	1	4	95	(73 & 22)				90 High
YR 10	6	12	82	(44 & 38)				97 High
YR 20	6	12	82	(35 & 47)				97 High
YR 40	5	12	83	(35 & 48)				98 High
YR 80	6	12	82	(34 & 48)				97 High

Modelled Activities:	Avg. Annual Activity	PNVT acres	Prob/yr	
Mixed Severity Fire	38 ac/yr	315,445	0.0001	
Stand Replace Fire	1,302 ac/yr	315,445	0.0041	
Rx Burning	6,500 ac/yr	299,673	0.022	(states C & D only)
Mastication	500 ac/yr	299,673	0.0017	(states C & D only)
Biomass Removal	3,000 ac/yr	299,673	0.01	(states C & D only)

VDDT Results – Alternative C

Semi-desert Grassland PNVT:
Alternative C low:

VDDT Modelling Conditions & Results					Alternative C: Low End			
Semi-Desert Grassland PNVT								
VDDT	**PNVT State/Class Proportions:**						**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	24	76	0	0					
Desired	10	80	5	5					
Current	1	20	49	30				31	Low
YR 00	1	20	49	30				31	Low
YR 10	8	44	25	23				62	Moderate
YR 20	7	64	12	16	1			81	High
YR 40	7	82	3	7	1			97	High
YR 80	6	84	7	1	2			92	High
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		152 ac/yr		125,712		0.0012			
Replacement Fire		266 ac/yr		125,712		0.0021			
Rx Burning		6,500 ac/yr		124,455		0.052	(states B,C,D only)		

Semi-desert Grassland PNVT:
Alternative C high:

VDDT Modelling Conditions & Results						Alternative C: High End			
Semi-Desert Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	24	76	0	0					
Desired	10	80	5	5					
Current	1	20	49	30				31	Low
YR 00	1	20	49	30				31	Low
YR 10	10	49	21	20				69	High
YR 20	9	70	9	12				89	High
YR 40	8	86	1	4	2			93	High
YR 80	8	86	3	0	3			91	High
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		152 ac/yr		125,712		0.0012			
Replacement Fire		266 ac/yr		125,712		0.0021			
Rx Burning		8,500 ac/yr		124,455		0.068	(states B,C,D only)		

Great Basin Grassland PNVT:
Alternative C low:

VDDT Modelling Conditions & Results							Alternative C: Low End		
Colorado Plateau/Great Basin Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	5	73	20	2					
Desired	5	73	20	2					
Current	6	56	24	14				83	High
YR 00	6	56	24	14				83	High
YR 10	3	56	30	11				81	High
YR 20	3	56	32	9				81	High
YR 40	3	58	33	6				83	High
YR 80	3	60	35	2				85	High
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		35 ac/yr		38,389		0.0009			
Replacement Fire		0 ac/yr		38,389		0			
Rx Burning		500 ac/yr		36,086		0.014	(states B,C,D only)		

Great Basin Grassland PNVT:
Alternative C high:

VDDT Modelling Conditions & Results							Alternative C: High End		
Colorado Plateau/Great Basin Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	5	73	20	2					
Desired	5	73	20	2					
Current	6	56	24	14				83	High
YR 00	6	56	24	14				83	High
YR 10	4	58	28	10				84	High
YR 20	4	63	26	7				89	High
YR 40	4	69	24	3				95	High
YR 80	4	70	25	1				96	High
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		35 ac/yr		38,389		0.0009			
Replacement Fire		0 ac/yr		38,389		0			
Rx Burning		1000 ac/yr		36,086		0.028	(states B,C,D only)		

Juniper Grasslands PNVT:
Alternative C low:

VDDT Modelling Conditions & Results							Alternative B,C,D: Low End		
Juniper Grasslands									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	25	B	50	B	10	10		
Desired	5	25	B	50	B	10	10		
Current	43	1	15	21	0	3	17	55	Moderate
YR 00	43	1	15	21	0	3	17	55	Moderate
YR 10	37	1	11	30	0	4	17	61	Moderate
YR 20	33	1	8	37	0	4	17	65	Moderate
YR 40	25	1	6	46	0	3	19	71	High
YR 80	17	1	5	54	0	2	21	73	High
	*The desired proportion of states C and E is combined with B for a total of 25%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Nonlethal Fire		105 ac/yr		137,274		0.0008			
Mixed Severity Fire		39 ac/yr		137,274		0.0003			
B Free Thin All Sizes		150 ac/yr		23,387		0.0064	state G only		
Rx Surface Fire		500 ac/yr		78,246		0.0064	not state A		
Rx Mixed Fire		0 ac/yr		78,246		0	not state A		

Juniper Grasslands PNVT:
Alternative C high:

VDDT Modelling Conditions & Results						Alternative B,C,D: High End			
Juniper Grasslands									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	25	B	50	B	10	10		
Desired	5	25	B	50	B	10	10		
Current	43	1	15	21	0	3	17	55	Moderate
YR 00	43	1	15	21	0	3	17	55	Moderate
YR 10	37	1	11	31	0	4	16	62	Moderate
YR 20	33	1	8	38	0	4	16	66	High
YR 40	26	1	7	46	0	3	17	72	High
YR 80	20	1	4	54	0	2	19	72	High
	*The desired proportion of states C and E is combined with B for a total of 25%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Nonlethal Fire		105 ac/yr		137,274		0.0008			
Mixed Severity Fire		39 ac/yr		137,274		0.0003			
B Free Thin All Sizes		200 ac/yr		23,387		0.0086	state G only		
Rx Surface Fire		800 ac/yr		78,246		0.01	not state A		
Rx Mixed Fire		0 ac/yr		78,246		0	not state A		

Pinyon-Juniper Evergreen Shrub PNVT:
Alternative C low:

VDDT Modelling Conditions & Results							Alternative B,C,D: Low End		
Pinyon-juniper Evergreen Shrub									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	55	B	40	B	0	0		
Desired	5	55	B	40	B	0	0		
Current	27	1	9	14	0	12	37	29	Low
YR 00	27	1	9	14	0	12	37	29	Low
YR 10	21	2	8	23	0	10	36	38	Moderate
YR 20	16	2	8	28	0	10	36	51	Moderate
YR 40	11	2	8	36	0	9	35	51	Moderate
YR 80	5	1	7	43	0	9	35	56	Moderate
	*The desired proportion of states C and E is combined with B for a total of 55%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Surface Fire		155 ac/yr		463,296		0.0003			
Mixed Severity Fire		196 ac/yr		463,296		0.0004			
B Free Thin All Sizes		150 ac/yr		227,015		0.0007	states F,G only		
Rx Surface Fire		1,200 ac/yr		338,206		0.0035	not state A		
Rx Mixed Fire		0 ac/yr		227,015		0	states E,F,G only		

Pinyon-Juniper Evergreen Shrub PNVT:
Alternative C high:

VDDT Modelling Conditions & Results							Alternative C,D: High End		
Pinyon-juniper Evergreen Shrub									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	55	B	40	B	0	0		
Desired	5	55	B	40	B	0	0		
Current	27	1	9	14	0	12	37	29	Low
YR 00	27	1	9	14	0	12	37	29	Low
YR 10	22	2	8	23	0	10	35	38	Moderate
YR 20	19	2	8	29	0	9	33	44	Moderate
YR 40	15	2	7	37	0	9	30	51	Moderate
YR 80	10	1	7	43	0	8	31	56	Moderate
	*The desired proportion of states C and E is combined with B for a total of 55%.								

Ponderosa Pine - Evergreen Oak PNVT:
Alternative C low:

VDDT Modelling Conditions & Results							Alternative C: Low end		
Ponderosa pine - evergreen oak									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	4	3	24	60	4	5			
Desired	4	3	24	60	4	5			
Current	12	47	1	2	35	3		17	Low
YR 00	12	47	1	2	35	3		17	Low
YR 10	6	33	7	15	33	6		38	Moderate
YR 20	4	25	7	21	33	10		44	Moderate
YR 40	3	19	6	24	34	14		46	Moderate
YR 80	3	18	5	23	34	17		44	Moderate

	Modelled Activities:	**Avg. Annual Activity**	**PNVT acres**		**Prob/yr**		
	Non-lethal Fire	63 ac/yr	63,539		0.001		
	Mixed Severity Fire	78 ac/yr	63,539		0.0012		
	Stand Replacing Fire	16 ac/yr	63,539		0.0003		
	Rx Surface Fire	2,200 ac/yr	31,770		0.069	states B,C,D,E only	
	B Free Thin All Sizes	25 ac/yr	29,863		0.0008	state B only	
	E Group Select w/ Matrix	100 ac/yr	22,239		0.0045	state E only	

Ponderosa Pine - Evergreen Oak PNVT:
Alternative C high:

VDDT Modelling Conditions & Results							Alternative C: High End		
Ponderosa pine - evergreen oak									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	4	3	24	60	4	5			
Desired	4	3	24	60	4	5			
Current	12	47	1	2	35	3		17	Low
YR 00	12	47	1	2	35	3		17	Low
YR 10	7	29	9	20	28	7		45	Moderate
YR 20	7	20	8	27	26	12		51	Moderate
YR 40	7	15	6	30	25	17		52	Moderate
YR 80	6	15	5	29	25	20		50	Moderate
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		63 ac/yr		63,539		0.001		
	Mixed Severity Fire		78 ac/yr		63,539		0.0012		
	Stand Replacing Fire		16 ac/yr		63,539		0.0003		
	Rx Surface Fire		4,500 ac/yr		31,770		0.142	states B,C,D,E only	
	B Free Thin All Sizes		100 ac/yr		29,863		0.0033	state B only	
	E Group Select w/ Matrix		300 ac/yr		22,239		0.013	state E only	

Ponderosa Pine - Gambel Oak PNVT:
Alternative C low:

VDDT Modelling Conditions & Results							Alternative C: Low End		
Ponderosa pine - Gambel Oak - conifer PNVT									
VDDT	**PNVT State/Class Proportions:**						**Desired Conditions**		
Results	**A/N**	**B,F**	**C**	**D,J/E,K***	**G**	**H,L,I,M***	**Index Value & Label**		
Reference	0	2	2	79	2	15			
Desired	0	2	2	79	2	15			
Current	6	2	0	1	37	54	20	Low	
YR 00	6	2	0	1	37	54	20	Low	
YR 10	1	11	2	6	29	51	27	Low	
YR 20	1	15	1	8	26	49	28	Low	
YR 40	0	18	1	11	23	47	31	Moderate	
YR 80	0	18	1	14	23	44	34	Moderate	
	* states J,K,L,M are multi-story and do not currently occur on the PNF.								
	Alternative A: No Action								
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		266 ac/yr		49,052		0.0054		
	Mixed Severity Fire		168 ac/yr		49,052		0.0034		
	Stand Replace Fire		7 ac/yr		49,052		0.0001		
	Rx Surface Fire		800 ac/yr		46,109		0.017	not state A	
	B Free Thin All Sizes		25 ac/yr		18,149		0.0014	state G only	
	E Group Select w/ Matrix		100 ac/yr		26,488		0.0038	states H,I only	

Ponderosa Pine - Gambel Oak PNVT:
Alternative C high:

VDDT Modelling Conditions & Results							Alternative C: High End		
Ponderosa pine - Gambel Oak - conifer PNVT									
VDDT	**PNVT State/Class Proportions:**						**Desired Conditions**		
Results	**A/N**	**B,F**	**C**	**D,J/E,K***	**G**	**H,L,I,M***	**Index Value & Label**		
Reference	0	2	2	79	2	15			
Desired	0	2	2	79	2	15			
Current	6	2	0	1	37	54	20	Low	
YR 00	6	2	0	1	37	54	20	Low	
YR 10	2	13	2	10	27	46	31	Low	
YR 20	0	18	2	12	24	44	33	Low	
YR 40	0	21	2	14	23	40	35	Moderate	
YR 80	0	20	1	16	22	41	36	Moderate	
	* states J,K,L,M are multi-story and do not currently occur on the PNF.								
	Alternative A: No Action								
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		266 ac/yr		49,052		0.0054		
	Mixed Severity Fire		168 ac/yr		49,052		0.0034		
	Stand Replace Fire		7 ac/yr		49,052		0.0001		
	Rx Surface Fire		2,000 ac/yr		46,109		0.043	not state A	
	B Free Thin All Sizes		100 ac/yr		18,149		0.0055	state G only	
	E Group Select w/ Matrix		300 ac/yr		26,488		0.011	states H,I only	

Interior Chaparral PNVT:
Alternative C low:

VDDT Modelling Conditions & Results

Alternative B/C/D: low end

Interior Chaparral PNVT

VDDT Results	PNVT State/Class Proportions: A	B	C & D		E	F	G	Desired Conditions Index Value & Label	
Reference	2	5	93						
Desired	5	10	85						
Current	1	4	95					90	High
				C D					
YR 00	1	4	95	(73 & 22)				90	High
YR 10	3	7	90	(44 & 46)				95	High
YR 20	3	8	89	(24 & 65)				96	High
YR 40	3	7	90	(23 & 67)				95	High
YR 80	3	8	90	(23 & 66)				96	High

Modelled Activities:	Avg. Annual Activity	PNVT acres	Prob/yr	
Mixed Severity Fire	38 ac/yr	315,445	0.0001	
Stand Replace Fire	1,302 ac/yr	315,445	0.0041	
Rx Burning	3,800 ac/yr	299,673	0.013	(states C & D only)
Mastication	200 ac/yr	299,673	0.0007	(states C & D only)
Biomass Removal	0 ac/yr	299,673	0	

Interior Chaparral PNVT:
Alternative C high:

VDDT Modelling Conditions & Results

Alternative C&D: high end

Interior Chaparral PNVT

VDDT Results	PNVT State/Class Proportions: A	B	C & D		E	F	G	Desired Conditions Index Value & Label
Reference	2	5	93					
Desired	5	10	85					
Current	1	4	95					90 High
				C D				
YR 00	1	4	95	(73 & 22)				90 High
YR 10	3	8	89	(44 & 46)				96 High
YR 20	3	8	89	(22 & 67)				96 High
YR 40	3	8	89	(22 & 68)				96 High
YR 80	3	8	89	(22 & 68)				96 High

Modelled Activities:	Avg. Annual Activity	PNVT acres	Prob/yr	
Mixed Severity Fire	38 ac/yr	315,445	0.0001	
Stand Replace Fire	1,302 ac/yr	315,445	0.0041	
Rx Burning	4,000 ac/yr	299,673	0.0133	(states C & D only)
Mastication	1,000 ac/yr	299,673	0.0033	(states C & D only)
Biomass Removal	1,000 ac/yr	299,673	0.0033	(states C & D only)

VDDT Results – Alternative D

Semi-desert Grassland PNVT:
Alternative D low:

VDDT Modelling Assumptions & Conditions						Alternative B/D: Low End			
Semi-Desert Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	24	76	0	0					
Desired	10	80	5	5					
Current	1	20	49	30				31	Low
YR 00	1	20	49	30				31	Low
YR 10	4	30	34	32				44	Moderate
YR 20	4	41	23	32				55	Moderate
YR 40	3	57	11	28	1			70	High
YR 80	3	61	19	15	2			74	High
	* Contemporary landscapes only - invasive plants state								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		152 ac/yr		125,712		0.0012			
Replacement Fire		266 ac/yr		125,712		0.0021			
Rx Burning		2,500 ac/yr		124,455		0.02	(states B,C,D only)		

Semi-desert Grassland PNVT:
Alternative D high:

VDDT Modelling Assumptions & Conditions						Alternative B/D: Low End			
Semi-Desert Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	24	76	0	0					
Desired	10	80	5	5					
Current	1	20	49	30				31	Low
YR 00	1	20	49	30				31	Low
YR 10	8	44	25	23				62	Moderate
YR 20	7	64	12	16	1			81	High
YR 40	7	82	3	7	1			97	High
YR 80	6	84	7	1	2			92	High
	* Contemporary landscapes only - invasive plants state								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		152 ac/yr		125,712		0.0012			
Replacement Fire		266 ac/yr		125,712		0.0021			
Rx Burning		6,500 ac/yr		124,455		0.052	(states B,C,D only)		

Great Basin Grassland PNVT:
Alternative D low:

VDDT Modelling Assumptions & Conditions							Alternative B/D: Low End		
Colorado Plateau/Great Basin Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	5	73	20	2					
Desired	5	73	20	2					
Current	6	56	24	14				83	High
YR 00	6	56	24	14				83	High
YR 10	2	54	32	12				78	High
YR 20	1	50	38	11				73	High
YR 40	2	46	44	8				70	High
YR 80	1	49	45	5				72	High
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		35 ac/yr		38,389		0.0009			
Replacement Fire		0 ac/yr		38,389		0			
Rx Burning		100 ac/yr		36,086		0.0028	(states B,C,D only)		

Great Basin Grassland PNVT:
Alternative D high:

VDDT Modelling Assumptions & Conditions							Alternative B/D: High End		
Colorado Plateau/Great Basin Grassland PNVT									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	5	73	20	2					
Desired	5	73	20	2					
Current	6	56	24	14				83	High
YR 00	6	56	24	14				83	High
YR 10	3	56	30	11				81	High
YR 20	3	56	32	9				81	High
YR 40	3	58	33	6				83	High
YR 80	3	60	35	2				85	High
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Mixed Severity Fire		35 ac/yr		38,389		0.0009			
Replacement Fire		0 ac/yr		38,389		0			
Rx Burning		500 ac/yr		36,086		0.014	(states B,C,D only)		

Juniper Grasslands PNVT:
Alternative D low:

VDDT Modelling Conditions & Results							Alternative B,C,D: Low End		
Juniper Grasslands									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	25	B	50	B	10	10		
Desired	5	25	B	50	B	10	10		
Current	43	1	15	21	0	3	17	55	Moderate
YR 00	43	1	15	21	0	3	17	55	Moderate
YR 10	37	1	11	30	0	4	17	61	Moderate
YR 20	33	1	8	37	0	4	17	65	Moderate
YR 40	25	1	6	46	0	3	19	71	High
YR 80	17	1	5	54	0	2	21	73	High
	*The desired proportion of states C and E is combined with B for a total of 25%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Nonlethal Fire		105 ac/yr		137,274		0.0008			
Mixed Severity Fire		39 ac/yr		137,274		0.0003			
B Free Thin All Sizes		150 ac/yr		23,387		0.0064	state G only		
Rx Surface Fire		500 ac/yr		78,246		0.0064	not state A		
Rx Mixed Fire		0 ac/yr		78,246		0	not state A		

Juniper Grasslands PNVT:
Alternative D high:

VDDT Modelling Conditions & Results						Alternative B,C,D: High End			
Juniper Grasslands									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	25	B	50	B	10	10		
Desired	5	25	B	50	B	10	10		
Current	43	1	15	21	0	3	17	55	Moderate
YR 00	43	1	15	21	0	3	17	55	Moderate
YR 10	37	1	11	31	0	4	16	62	Moderate
YR 20	33	1	8	38	0	4	16	66	High
YR 40	26	1	7	46	0	3	17	72	High
YR 80	20	1	4	54	0	2	19	72	High
	*The desired proportion of states C and E is combined with B for a total of 25%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Nonlethal Fire		105 ac/yr		137,274		0.0008			
Mixed Severity Fire		39 ac/yr		137,274		0.0003			
B Free Thin All Sizes		200 ac/yr		23,387		0.0086	state G only		
Rx Surface Fire		800 ac/yr		78,246		0.01	not state A		
Rx Mixed Fire		0 ac/yr		78,246		0	not state A		

Pinyon-Juniper Evergreen Shrub PNVT:
Alternative D low:

VDDT Modelling Conditions & Results							Alternative B,C,D: Low End		
Pinyon-juniper Evergreen Shrub									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	55	B	40	B	0	0		
Desired	5	55	B	40	B	0	0		
Current	27	1	9	14	0	12	37	29	Low
YR 00	27	1	9	14	0	12	37	29	Low
YR 10	21	2	8	23	0	10	36	38	Moderate
YR 20	16	2	8	28	0	10	36	51	Moderate
YR 40	11	2	8	36	0	9	35	51	Moderate
YR 80	5	1	7	43	0	9	35	56	Moderate
	*The desired proportion of states C and E is combined with B for a total of 55%.								
Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**			
Surface Fire		155 ac/yr		463,296		0.0003			
Mixed Severity Fire		196 ac/yr		463,296		0.0004			
B Free Thin All Sizes		150 ac/yr		227,015		0.0007	states F,G only		
Rx Surface Fire		1,200 ac/yr		338,206		0.0035	not state A		
Rx Mixed Fire		0 ac/yr		227,015		0	states E,F,G only		

Pinyon-Juniper Evergreen Shrub PNVT:
Alternative D high:

VDDT Modelling Conditions & Results							Alternative C,D: High End		
Pinyon-juniper Evergreen Shrub									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C***	**D**	**E***	**F**	**G**	**Index Value & Label**	
Reference	5	55	B	40	B	0	0		
Desired	5	55	B	40	B	0	0		
Current	27	1	9	14	0	12	37	29	Low
YR 00	27	1	9	14	0	12	37	29	Low
YR 10	22	2	8	23	0	10	35	38	Moderate
YR 20	19	2	8	29	0	9	33	44	Moderate
YR 40	15	2	7	37	0	9	30	51	Moderate
YR 80	10	1	7	43	0	8	31	56	Moderate
	*The desired proportion of states C and E is combined with B for a total of 55%.								

Ponderosa Pine - Evergreen Oak PNVT:
Alternative D low:

VDDT Modelling Assumptions & Conditions							Alternative B&D: low end		
Ponderosa pine - evergreen oak									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	4	3	24	60	4	5			
Desired	4	3	24	60	4	5			
Current	12	47	1	2	35	3		17	Low
YR 00	12	47	1	2	35	3		17	Low
YR 10	6	33	6	16	33	6		38	Moderate
YR 20	4	25	7	21	33	10		44	Moderate
YR 40	3	20	5	24	34	14		45	Moderate
YR 80	2	19	5	24	34	16		45	Moderate
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		63 ac/yr		63,539		0.001		
	Mixed Severity Fire		78 ac/yr		63,539		0.0012		
	Stand Replacing Fire		16 ac/yr		63,539		0.0003		
	Rx Surface Fire		2,000 ac/yr		31,770		0.063	states B,C,D,E only	
	B Free Thin All Sizes		25 ac/yr		29,863		0.0008	state B only	
	E Group Select w/ Matrix		100 ac/yr		22,239		0.0045	state E only	

Ponderosa Pine - Evergreen Oak PNVT:
Alternative D high:

VDDT Modelling Assumptions & Conditions							Alternative B&D: high end		
Ponderosa pine - evergreen oak									
VDDT	**PNVT State/Class Proportions:**							**Desired Conditions**	
Results	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**Index Value & Label**	
Reference	4	3	24	60	4	5			
Desired	4	3	24	60	4	5			
Current	12	47	1	2	35	3		17	Low
YR 00	12	47	1	2	35	3		17	Low
YR 10	7	30	8	19	29	7		43	Moderate
YR 20	6	21	8	26	27	12		50	Moderate
YR 40	6	16	6	29	26	17		51	Moderate
YR 80	6	16	6	28	25	19		50	Moderate
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		63 ac/yr		63,539		0.001		
	Mixed Severity Fire		78 ac/yr		63,539		0.0012		
	Stand Replacing Fire		16 ac/yr		63,539		0.0003		
	Rx Surface Fire		4,000 ac/yr		31,770		0.126	states B,C,D,E only	
	B Free Thin All Sizes		100 ac/yr		29,863		0.0033	state B only	
	E Group Select w/ Matrix		300 ac/yr		22,239		0.013	state E only	

Ponderosa Pine - Gambel Oak PNVT:
Alternative D low:

VDDT Modelling Conditions & Results							Alternative B,D: Low End		
Ponderosa pine - Gambel Oak - conifer PNVT									
VDDT	**PNVT State/Class Proportions:**						**Desired Conditions**		
Results	**A/N**	**B,F**	**C**	**D,J/E,K***	**G**	**H,L,I,M***	**Index Value & Label**		
Reference	0	2	2	79	2	15			
Desired	0	2	2	79	2	15			
Current	6	2	0	1	37	54	20	Low	
YR 00	6	2	0	1	37	54	20	Low	
YR 10	2	10	1	7	29	51	27	Low	
YR 20	0	15	1	8	26	50	28	Low	
YR 40	0	18	1	11	23	47	31	Moderate	
YR 80	0	17	1	14	23	45	34	Moderate	
	* states J,K,L,M are multi-story and do not currently occur on the PNF.								
	Alternative A: No Action								
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		266 ac/yr		49,052		0.0054		
	Mixed Severity Fire		168 ac/yr		49,052		0.0034		
	Stand Replace Fire		7 ac/yr		49,052		0.0001		
	Rx Surface Fire		500 ac/yr		46,109		0.012	not state A	
	B Free Thin All Sizes		25 ac/yr		18,149		0.0014	state G only	
	E Group Select w/ Matrix		100 ac/yr		26,488		0.0038	states H,I only	

Ponderosa Pine - Gambel Oak PNVT:
Alternative D high:

VDDT Modelling Conditions & Results							Alternative B,D: High End		
Ponderosa pine - Gambel Oak - conifer PNVT									
VDDT	**PNVT State/Class Proportions:**						**Desired Conditions**		
Results	**A/N**	**B,F**	**C**	**D,J/E,K***	**G**	**H,L,I,M***	**Index Value & Label**		
Reference	0	2	2	79	2	15			
Desired	0	2	2	79	2	15			
Current	6	2	0	1	37	54	20	Low	
YR 00	6	2	0	1	37	54	20	Low	
YR 10	2	11	2	9	28	48	30	Low	
YR 20	1	17	1	11	24	46	31	Low	
YR 40	0	20	1	13	23	43	33	Moderate	
YR 80	0	19	1	16	22	42	36	Moderate	
	* states J,K,L,M are multi-story and do not currently occur on the PNF.								
	Alternative A: No Action								
	Modelled Activities:		**Avg. Annual Activity**		**PNVT acres**		**Prob/yr**		
	Non-lethal Fire		266 ac/yr		49,052		0.0054		
	Mixed Severity Fire		168 ac/yr		49,052		0.0034		
	Stand Replace Fire		7 ac/yr		49,052		0.0001		
	Rx Surface Fire		1,000 ac/yr		46,109		0.022	not state A	
	B Free Thin All Sizes		100 ac/yr		18,149		0.0055	state G only	
	E Group Select w/ Matrix		300 ac/yr		26,488		0.011	states H,I only	

Interior Chaparral PNVT:
Alternative D low:
VDDT Modelling Conditions & Results Alternative B/C/D: low end

Interior Chaparral PNVT

VDDT Results	PNVT State/Class Proportions: A	B	C & D		E	F	G	Desired Conditions Index Value & Label	
Reference	2	5	93						
Desired	5	10	85						
Current	1	4	95					90	High
				C D					
YR 00	1	4	95	(73 & 22)				90	High
YR 10	3	7	90	(44 & 46)				95	High
YR 20	3	8	89	(24 & 65)				96	High
YR 40	3	7	90	(23 & 67)				95	High
YR 80	3	8	90	(23 & 66)				96	High

Modelled Activities:	Avg. Annual Activity	PNVT acres	Prob/yr	
Mixed Severity Fire	38 ac/yr	315,445	0.0001	
Stand Replace Fire	1,302 ac/yr	315,445	0.0041	
Rx Burning	3,800 ac/yr	299,673	0.013	(states C & D only)
Mastication	200 ac/yr	299,673	0.0007	(states C & D only)
Biomass Removal	0 ac/yr	299,673	0	

Interior Chaparral PNVT:
Alternative D high:

VDDT Modelling Conditions & Results

Alternative C&D: high end

Interior Chaparral PNVT

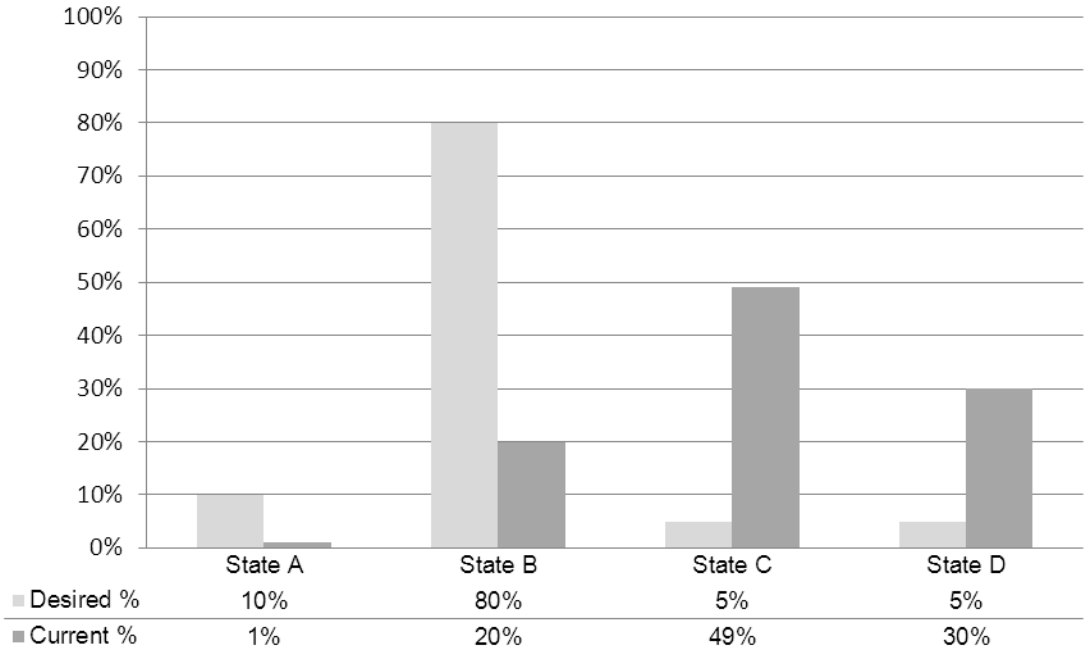
VDDT Results	PNVT State/Class Proportions: A	B	C & D		E	F	G	Desired Conditions Index Value & Label
Reference	2	5	93					
Desired	5	10	85					
Current	1	4	95					90 High
				C D				
YR 00	1	4	95	(73 & 22)				90 High
YR 10	3	8	89	(44 & 46)				96 High
YR 20	3	8	89	(22 & 67)				96 High
YR 40	3	8	89	(22 & 68)				96 High
YR 80	3	8	89	(22 & 68)				96 High

Modelled Activities:	Avg. Annual Activity	PNVT acres	Prob/yr	
Mixed Severity Fire	38 ac/yr	315,445	0.0001	
Stand Replace Fire	1,302 ac/yr	315,445	0.0041	
Rx Burning	4,000 ac/yr	299,673	0.0133	(states C & D only)
Mastication	1,000 ac/yr	299,673	0.0033	(states C & D only)
Biomass Removal	1,000 ac/yr	299,673	0.0033	(states C & D only)

PNVT States

The graphs on the following pages display the current and desired future conditions for each of the 10 PNVTs at the landscape-scale. Each PNVT is described by a unique set of states and the proportional difference between the current and desired conditions can be discerned. This information provides a set of baseline conditions useful for measuring progress towards desired conditions over time.

Semi-Desert Grassland

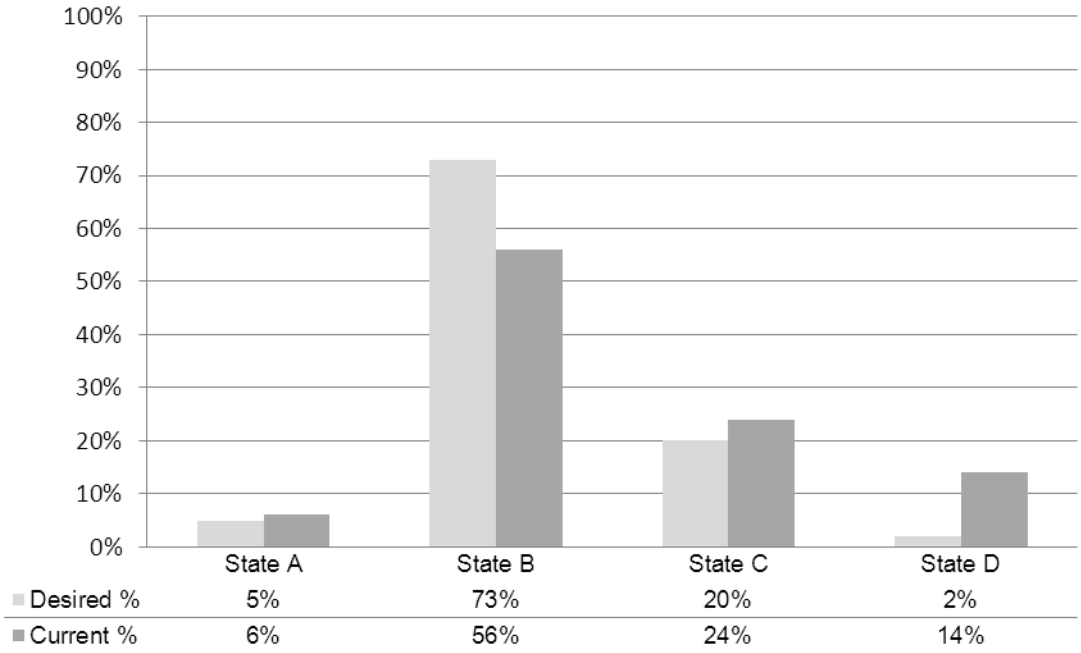


Semi-Desert Grassland PNVT Vegetation Structural States:

- State A - Herbaceous vegetation regeneration, recently burned, sparsely vegetated; with < 10% tree or shrub canopy cover; early development. Mid-scale vegetation classification codes: RB, SVG
- State B - Perennial herbaceous vegetation, with < 10% tree or shrub canopy cover; mid development. Mid-scale vegetation classification code: GFB
- State C - Perennial herbaceous vegetation with shrubs, seedling and sapling size (< 5" dia.), small size (5"-9.9" dia.) trees with open (< 30%) canopy cover; late development; not part of the historic conditions, found on contemporary landscapes only. Mid-scale vegetation classification codes: SHO, SSO, SMO
- State D - Shrubs, seedling and sapling, small, medium size (> 20" dia.) trees with closed (≥ 30%) canopy cover, and large to very large size trees with open canopy cover with perennial herbaceous vegetation, mid development; not part of the historic conditions, found on contemporary landscapes only. Mid-scale vegetation classification codes: SHC, SSC, SMC, VOS

The Semi-Desert Grassland PNVT exhibits a low similarity (31%) to desired conditions. The desired condition descriptions and proportions were developed by the Prescott NF planning team, led by the forest planning ecologist.

Great Basin Grassland

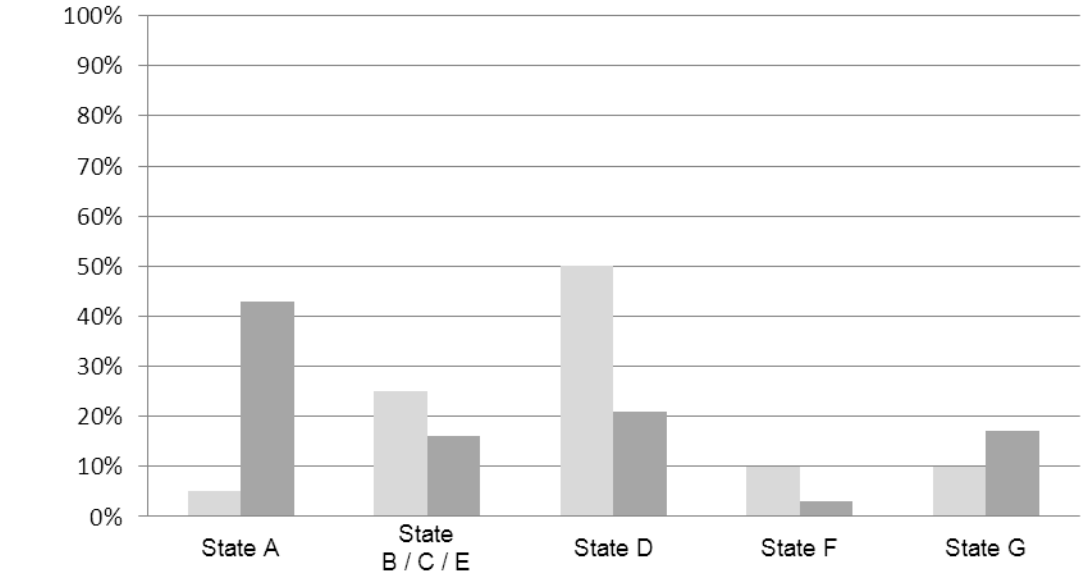


Great Basin Grassland PNVT Vegetation Structural States:

- State A – Herbaceous vegetation regeneration, recently burned, sparsely vegetated; with < 10% tree or shrub canopy cover; early development. Mid-scale vegetation classification codes: RB, SVG
- State B - Open perennial herbaceous vegetation, with < 10% tree or shrub canopy cover; mid development. Mid-scale vegetation classification code: GFB
- State C - Perennial herbaceous vegetation with shrubs, seedling and sapling size (< 5” dia.), small size (5”-9.9” dia.), and medium size (10”-19.9” dia.) trees with open (< 30%) canopy cover; late development. Mid-scale vegetation classification codes: SHO, SSO, SMO, MOS
- State D - Shrubs, seedling and sapling size (< 5” dia.), small size (5”-9.9” dia.), and medium size (10”-19.9” dia.) trees with closed (≥ 30%) canopy cover: mid development. Mid-scale vegetation classification codes: SHC, SSC, SMC, MCS

The Great Basin Grassland PNVT exhibits a high similarity (83%) to desired conditions. The desired condition descriptions and proportions were developed by the Prescott NF planning team, led by the forest planning ecologist.

Juniper Grassland

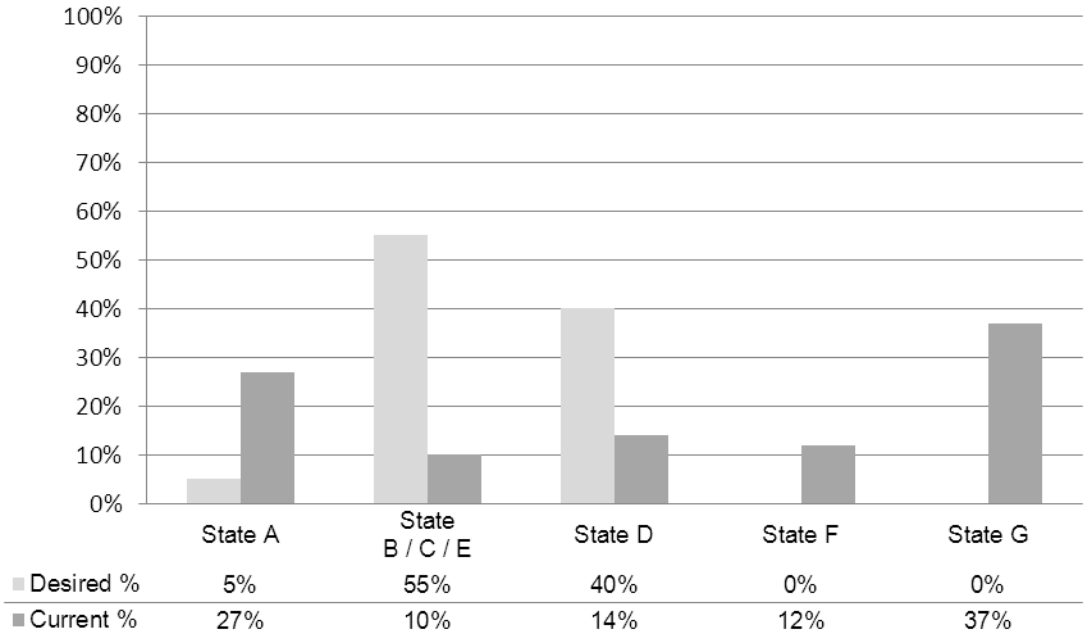


Juniper Grassland PNVT Vegetation Structural States:

- State A – Recently burned, grass, forb and shrub types with < 10% tree canopy cover; early development. Mid-scale vegetation classification codes: RB, GFB, SHR
- State B - Seedling and sapling size (< 5" dia.) trees with open (< 30%) canopy cover; all tree types; early development. Mid-scale vegetation classification code: SSO
- State C - Small size (5"-9.9" dia.) trees, with open canopy cover; all tree types; mid development. The current and desired proportion of State C is included in State B. Mid-scale vegetation classification code: SMO
- State D - Medium and large to very large size (≥ 10" dia.) trees, with open canopy cover; all tree types; late development. Mid-scale vegetation classification code: MVO
- State E - Seedling and sapling size trees with closed (≥ 30%) canopy cover; all tree types; early development. The current and desired proportion of State E is included in State B. Mid-scale vegetation classification code: SSC
- State F - Small size trees, with closed canopy cover; all tree types; mid development. Mid-scale vegetation classification code: SMC
- State G - Medium and large to very large size trees, with closed canopy cover; all tree types; late development. Mid-scale vegetation classification code: MVC

The Juniper Grassland PNVT exhibits a moderate similarity (55%) to desired conditions. The desired condition descriptions and proportions were provided by the Forest Service Southwestern Regional Office.

Piñon-Juniper Evergreen Shrub

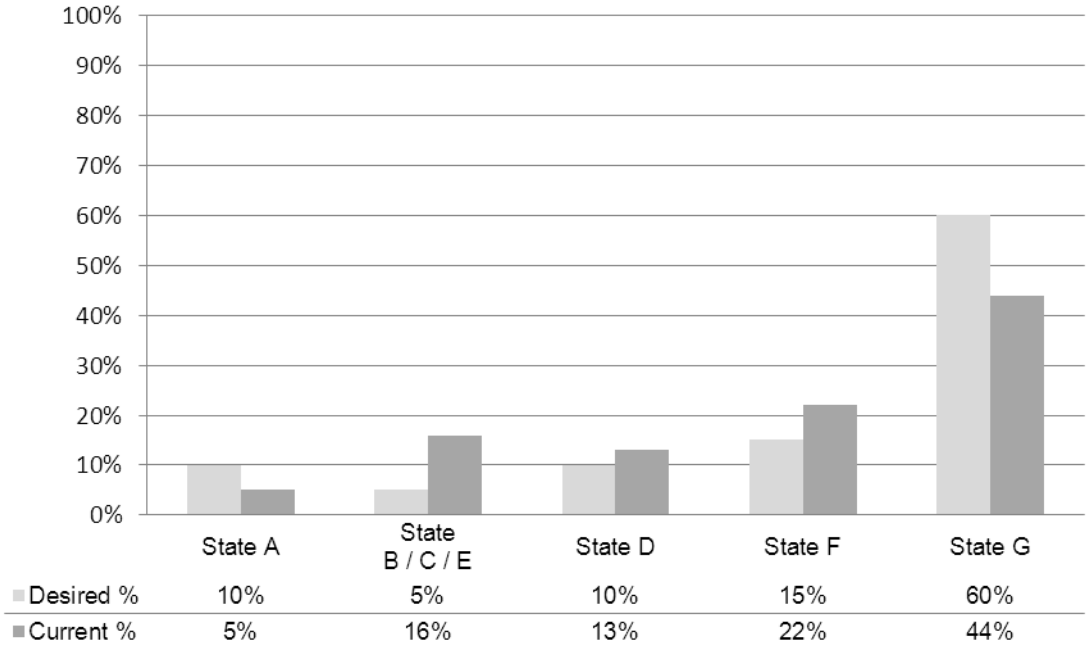


Piñon-Juniper Evergreen Shrub PNVT Vegetation Structural States:

- State A – Recently burned, grass, forb and shrub types with < 10% tree canopy cover; early development. Mid-scale vegetation classification codes: RB, GFB, SHR
- State B - Seedling and sapling size (< 5" dia.) trees with open (< 30%) canopy cover; all tree types; early development. Mid-scale vegetation classification code: SSO
- State C - Small size (5"-9.9" dia.) trees, with open canopy cover; all tree types; mid development. The current and desired proportion of State C is included in State B. Mid-scale vegetation classification code: SMO
- State D - Medium and large to very large size (≥ 10" dia.) trees, with open canopy cover; all tree types; late development. Mid-scale vegetation classification code: MVO
- State E - Seedling and sapling size trees with closed (≥ 30%) canopy cover; all tree types; early development. The current and desired proportion of State E is included in State B. Mid-scale vegetation classification code: SSC
- State F - Small size trees, with closed canopy cover; all tree types; mid development. Mid-scale vegetation classification code: SMC
- State G - Medium and large to very large size trees, with closed canopy cover; all tree types; late development. Mid-scale vegetation classification code: MVC

The Piñon-Juniper Evergreen Shrub PNVT exhibits a low similarity (29%) to desired conditions. The desired condition descriptions and proportions were provided by the Forest Service Southwestern Regional Office.

Piñon-Juniper Woodland

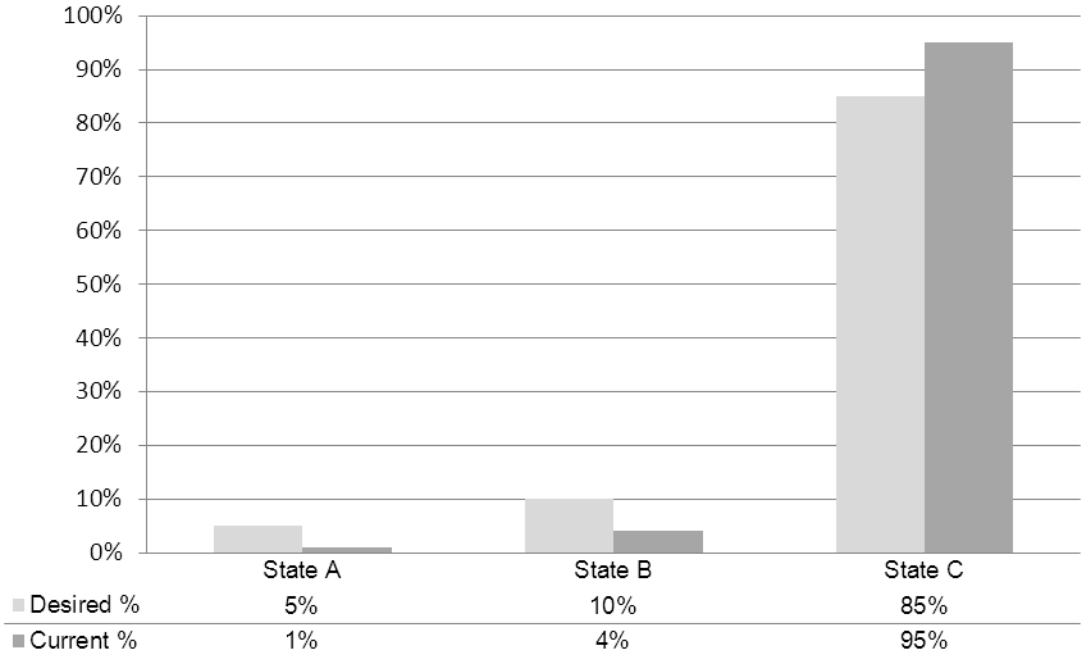


Piñon-Juniper Woodland PNVT Vegetation Structural States:

- State A – Recently burned, grass, forb and shrub types with < 10% tree canopy cover; early development. Mid-scale vegetation classification codes: RB, GFB, SHR
- State B - Seedling and sapling size (< 5" dia.) trees with open (< 30%) canopy cover; all tree types; early development. Mid-scale vegetation classification code: SSO
- State C - Small size (5"-9.9" dia.) trees, with open canopy cover; all tree types; mid development. The current and desired proportion of State C is included in State B. Mid-scale vegetation classification code: SMO
- State D - Medium and large to very large size (≥ 10" dia.) trees, with open canopy cover; all tree types; late development. Mid-scale vegetation classification code: MVO
- State E - Seedling and sapling size trees with closed (≥ 30%) canopy cover; all tree types; early development. The current and desired proportion of State E is included in State B. Mid-scale vegetation classification code: SSC
- State F - Small size trees, with closed canopy cover; all tree types; mid development. Mid-scale vegetation classification code: SMC
- State G - Medium and large to very large size trees, with closed canopy cover; all tree types; late development. Mid-scale vegetation classification code: MVC

The Piñon-Juniper Woodland PNVT exhibits a high similarity (79%) to desired conditions. The desired condition descriptions and proportions were provided by the Forest Service Southwestern Regional Office.

Interior Chaparral

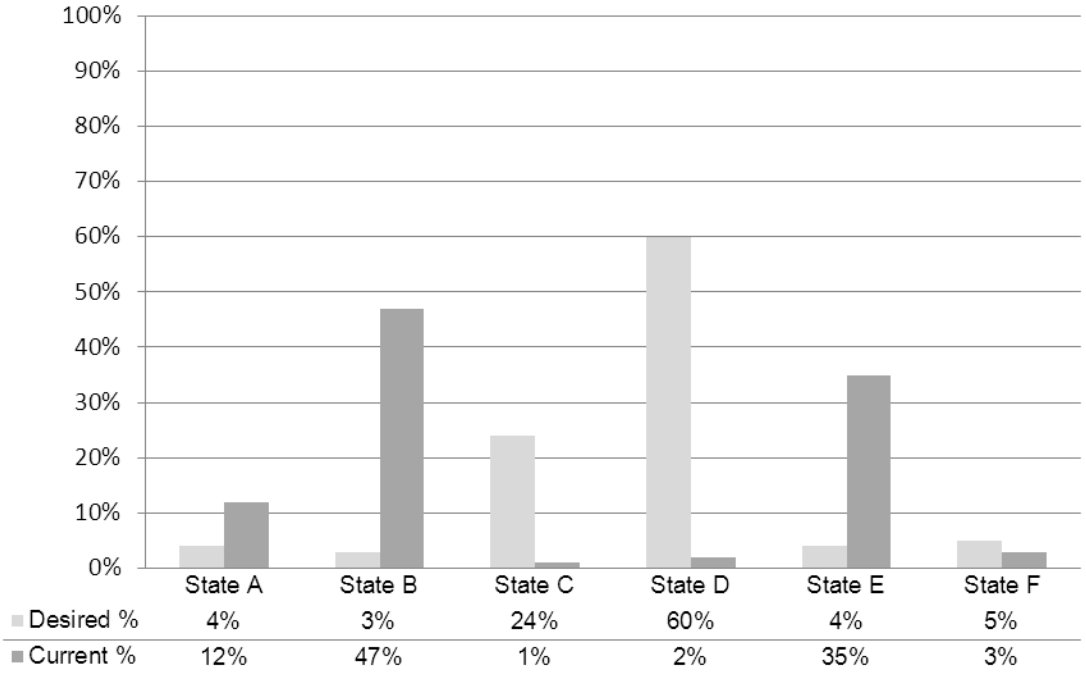


Interior Chaparral PNVT Vegetation Structural States:

- State A – Herbaceous vegetation regeneration, recently burned, sparsely vegetated; with < 10% shrub or tree canopy cover; early development. Mid-scale vegetation classification codes: RB, SVG, GFB
- State B - Open perennial herbaceous vegetation, with shrubs, seedling and sapling size (< 5" dia.) and small size (5"-9.9" dia.) trees with open (<30%) canopy cover; mid development. Mid-scale vegetation classification code: SHO, SSO, SMO
- State C - Shrubs, seedling and sapling, small, and medium size (10"-19.9" dia.) trees with closed (≥ 30%) canopy cover with no herbaceous vegetation understory; late development. Mid-scale vegetation classification code: SHC, SSC, SMC, MVC

The Interior Chaparral PNVT exhibits a high similarity (90%) to desired conditions. The desired condition descriptions and proportions were developed by the Prescott NF planning team, led by the forest planning ecologist.

Ponderosa Pine-Evergreen Oak



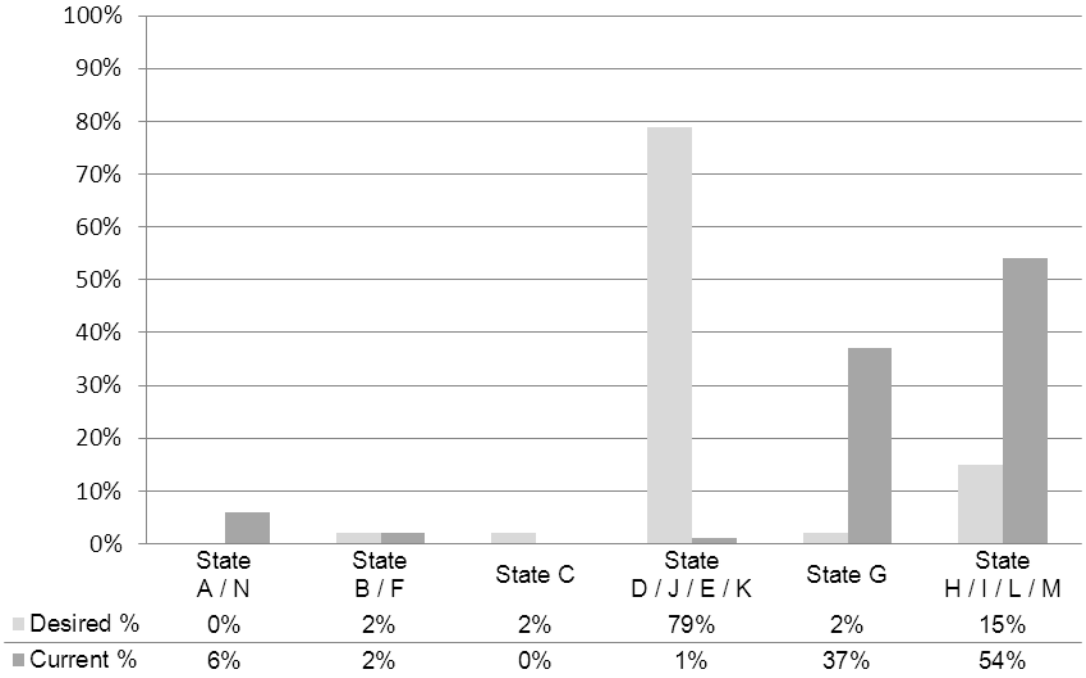
	State A	State B	State C	State D	State E	State F
Desired %	4%	3%	24%	60%	4%	5%
Current %	12%	47%	1%	2%	35%	3%

Ponderosa Pine-Evergreen Oak PNVT Vegetation Structural States:

- State A – Recently burned, grass, forb and shrub types with < 10% tree canopy cover; early development. Mid-scale vegetation classification codes: RB, SVG, GFB
- State B - Small size (5”-9.9” dia.) trees, with closed (≥ 30%) cover; all tree types; mid development. Mid-scale vegetation classification code: SMC
- State C - Small size (5”-9.9” dia.) trees, with open canopy cover; all tree types; mid development. Mid-scale vegetation classification code: SMO
- State D - Medium and large to very large size (≥ 10” dia.) trees, with open canopy cover; all tree types; late development. Mid-scale vegetation classification code: MVO
- State E - Medium and large to very large size (≥ 10” dia.) trees, with closed (≥ 30%) cover; all tree types; late development. Mid-scale vegetation classification code: MVC
- State F – Re-sprouter dominated seedling and sapling size trees with closed (≥ 30%) canopy cover; all tree types; early development. Mid-scale vegetation classification code: SSA

The Ponderosa Pine-Evergreen Oak PNVT exhibits a low similarity (24%) to desired conditions. The desired condition descriptions and proportions were provided by the Forest Service Southwestern Regional Office.

Ponderosa Pine-Gambel Oak



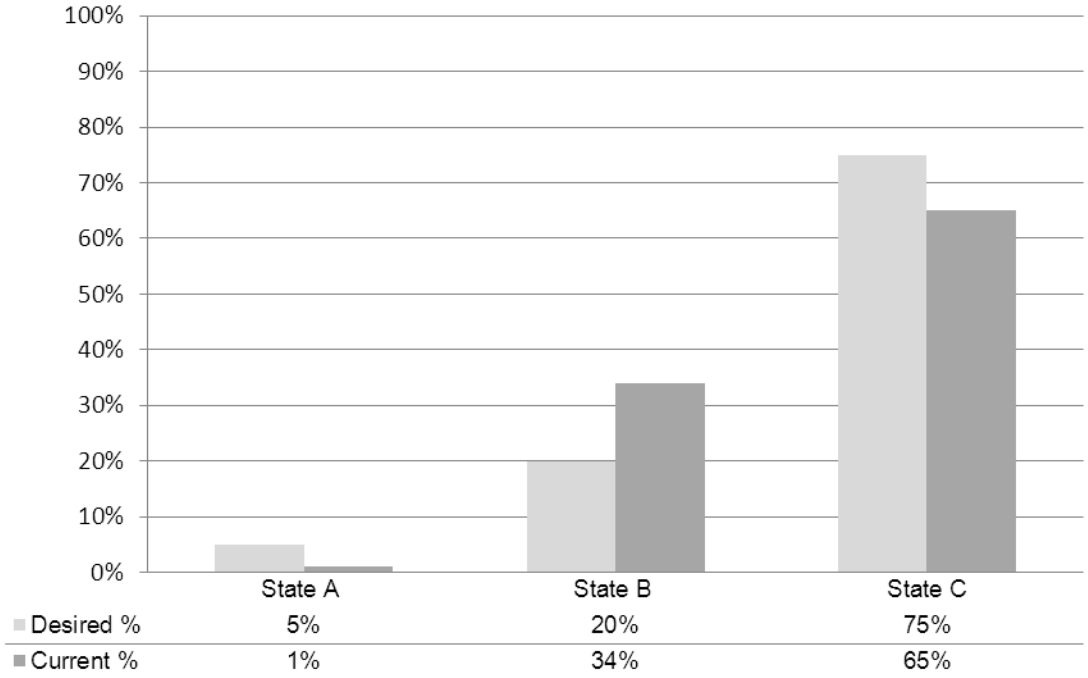
Ponderosa Pine- Gambel Oak PNVT Vegetation Structural States:

- State A – Recently burned, grass, forb and shrub types with < 10% tree canopy cover; early development. Mid-scale vegetation classification codes: GFB, SHR
- State B - Seedling and sapling size (< 5" dia.) trees with open (< 30%) canopy cover; all tree types; early development. Mid-scale vegetation classification code: SSO
- State C - Small size (5"-9.9" dia.) trees, with open canopy cover; all tree types; mid development. Mid-scale vegetation classification code: SMO
- State D - Medium size (10"-19.9" dia.) trees, single storied, with open canopy cover; all tree types; late development. Mid-scale vegetation classification code: MOS
- State E - Large to very large size (≥ 20" dia.) trees, single storied, with open canopy cover; all tree types; late development. Mid-scale vegetation classification code: VOS
- State F – Seedling and sapling size trees with closed (≥ 30%) canopy cover; all tree types; early development. Mid-scale vegetation classification code: SSC
- State G – Small size trees, with closed canopy cover; all tree types; mid development; not part of the historic conditions, found on contemporary landscapes only. Mid-scale vegetation classification code: SMC
- State H – Medium size trees, single storied, with closed canopy cover; all shade tree types; late development; not part of the historic conditions, found on contemporary landscapes only. Mid-scale vegetation classification codes: MCS
- State I - Large to very large size trees, single storied, with closed canopy cover; all tree types; late development; not part of the historic conditions, found on contemporary landscapes only. Mid-scale vegetation classification code: VCS
- State J - Medium size trees, multi-storied, with open canopy cover; all tree types; late development. This state does not currently exist on the Prescott NF. Mid-scale vegetation classification code: MOM

- State K - Large to very large size trees, multi-storied, with open canopy cover; all tree types; late development. This state does not currently exist on the Prescott NF. Mid-scale vegetation classification code: VOM
- State L - Medium size trees, multi-storied, with closed canopy cover; all tree types; late development; not part of the historic conditions, found on contemporary landscapes only. This state does not currently exist on the Prescott NF. Mid-scale vegetation classification code: MCM
- State M – Large to very large size trees, multi-storied, with closed canopy cover; tree types; late development; not part of the historic conditions, found on contemporary landscapes only. This state does not currently exist on the Prescott NF. Mid-scale vegetation classification code: VCM
- State N – Recently burned, grass, forb and shrub types with < 10% tree canopy cover; uncharacteristic early development due to fire; not part of the historic conditions, found on contemporary landscapes only. Mid-scale vegetation classification code: GFB, SHR

The Ponderosa Pine- Gambel Oak PNVT exhibits a low similarity (20%) to desired conditions. The desired condition descriptions and proportions were provided by the Forest Service Southwestern Regional Office.

Desert Communities

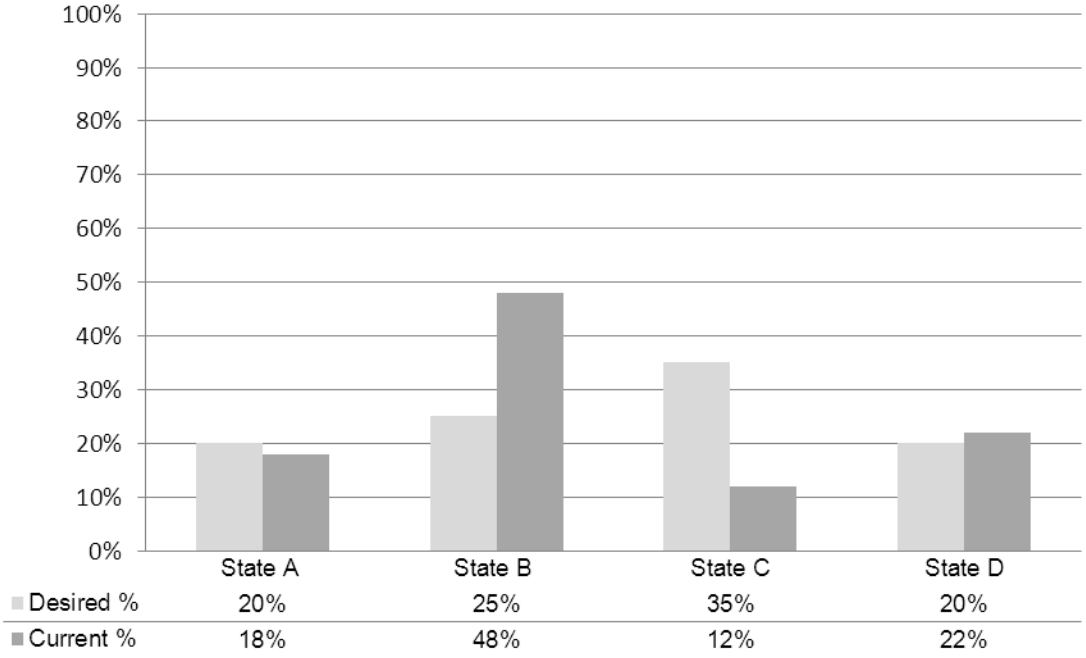


Desert Communities PNVT Vegetation Structural States:

- State A – Herbaceous vegetation, recently burned, sparsely vegetated; with < 10% tree or shrub canopy cover; early development. Mid-scale vegetation classification codes: RB, SVG, GFB
- State B - Shrubs, and small woody plants and trees (1”-9.9” dia.), with open (< 30%) canopy cover; mid development. Mid-scale vegetation classification code: SHO
- State C - Shrubs, medium size or larger (>10” dia.) cactus and trees with open (< 30%) canopy cover; late development. Mid-scale vegetation classification code: SHC, SSO, SMO, SMC, MVO

The Desert Communities PNVT exhibits a high similarity (86%) to desired conditions. The desired condition descriptions and proportions were provided by the Forest Service Southwestern Regional Office.

Riparian Gallery Forest



Riparian Gallery Forest PNVT Vegetation Structural States:

- State A – Herbaceous vegetation regeneration, recently burned, sparsely vegetated; shrubs, seedling and sapling size (< 5" dia.) trees; early development. Mid-scale vegetation classification codes: RB, SVG, GFB, SHR, SSA
- State B - Small size (5"-9.9" dia.), and medium size (10"-19.9" dia.) trees with generally closed (> 30%) canopy cover; mid development. Mid-scale vegetation classification code: SMO, SMC, MOS, MCS
- State C - Large to very large size (> 20" dia.) trees with open or closed canopy cover; late development. Mid-scale vegetation classification codes: VCS, VOS
- State D - Mesquite dominated shrub mixes; late development closed (> 30%) canopy cover. Mid-scale vegetation classification codes: SHR

The Riparian Gallery Forest PNVT exhibits a high similarity (75%) to desired conditions. The desired condition descriptions and proportions were provided by the Forest Service Southwestern Regional Office.